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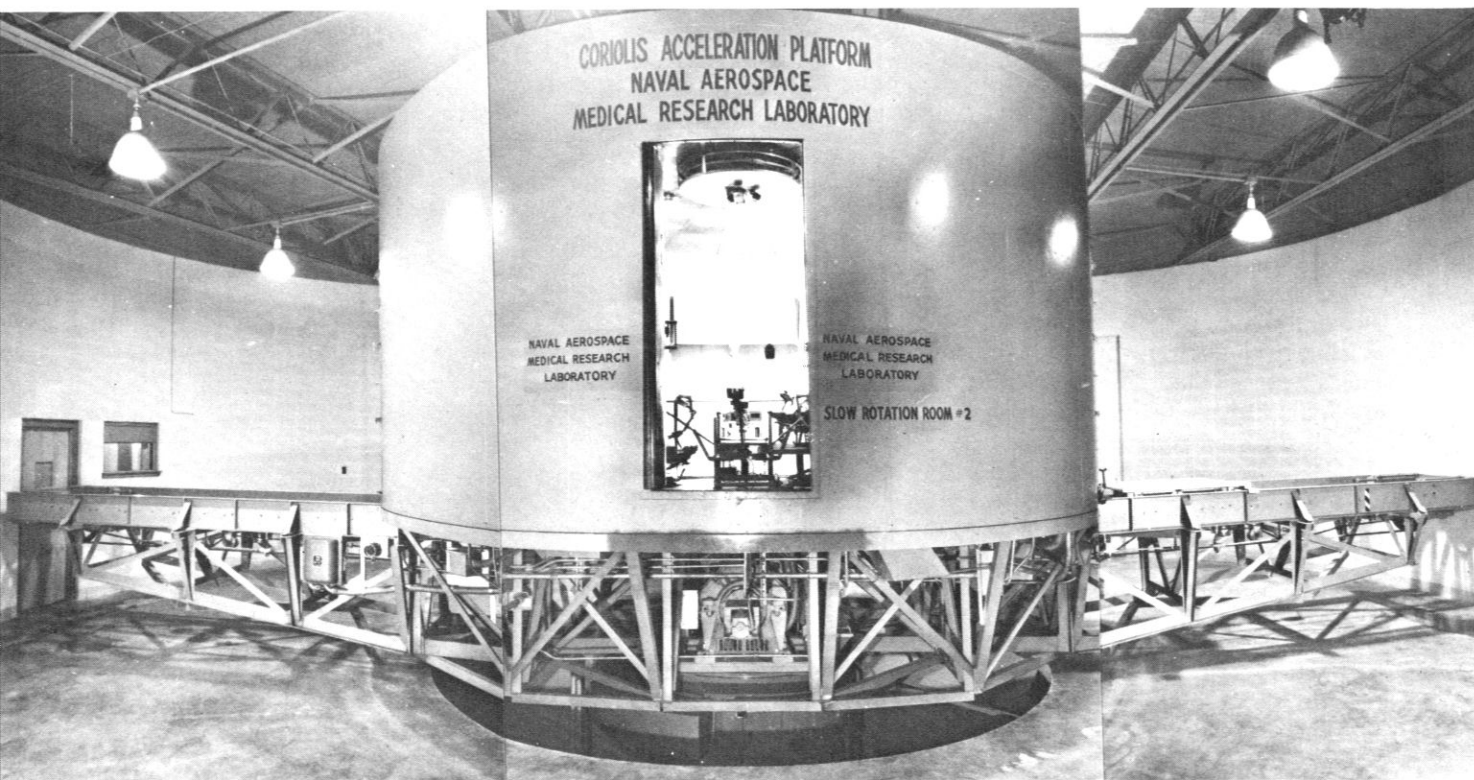
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U.S. NAVY MEDICINE

Volume 67, Number 11, November 1976

- 1 **Department Rounds**
Hope for the queasy . . . Promotion slowdown
- 4 **BUMED SITREP**
- 5 **NAVMED Newsmakers**
- 6 **Features**
What's a Veterinarian Doing Here?
CAPT J.H. Wright, USAF, VC
- 9 **Enlisted Scene**
Petty officers' performance reviewed
- 10 **Soundings**
Let's Stop Prescribing Cold Medications
CDR A.L. Gorske, MC, USN
- 14 **Off Duty** Thanksgiving story: One year later
- 16 **Policy** Instructions and directives
- 17 **Clinical Notes**
Better Pesticides for Submarines
LCDR R.V. Peterson, MSC, USN
LCDR D.M. McCroddan, MSC, USN
- 19 **Professional**
Acclimatization and High Altitude Medical Problems in Antarctica
LCDR D.B. Moyer, MC, USNR
- 22 **Residual Odontogenic Keratinizing Cyst: Report of a Case**
CAPT E.L. Mosby, DC, USN
CAPT W.E. Sugg, Jr., DC, USN
- 24 **Treatment of Infrabony Osseous Defects by Grafting: A Review of the Literature. II. Recent Success With Autografts and Homografts**
CDR G.B. Groff, DC, USN
- 29 **Notes and Announcements**
Dental continuing education courses set . . . Postdoctoral associateships at Navy research activities . . . Laser classification aid offered . . . Ambulance safety course

COVER: At Naval Aerospace Medical Research Laboratory, Pensacola, a device known as the ZARR (Z-axis recumbent rotation) rotates a subject about the long-body axis during studies of the body's adaptation to motion. Although designed for use in parabolic flight, the ZARR has also helped extend the scope of ground-based motion sickness studies. Current research deals not only with organs of equilibrium (semicircular canals and otolith organs) but also with touch, pressure, and kinesthetic receptor systems. For more about the Medical Department's efforts to conquer motion sickness, see "Hope for the Queasy," beginning on page 1.



Slow rotation room at Naval Aerospace Medical Research Lab, Pensacola

Department Rounds

Research

Hope for the Queasy

A naval aviator turns green and reaches for a paper bag. A sailor hits the deck without being ordered to. A Navy ambulance driver on a curving mountain road gets dizzy, a little nauseous, and can't see clearly.

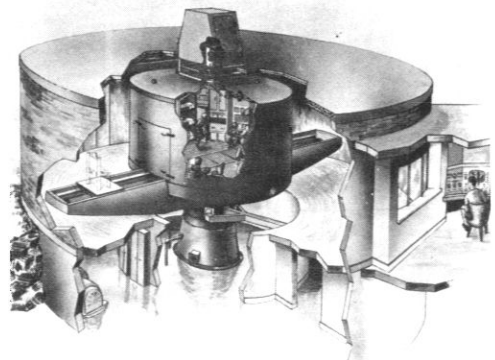
They're victims of a problem as old as the wheel or the rowboat: motion sickness. Because the malady has always hit hard at the crews of ships and airplanes, Navy investigators have been after a cure for many years.

Researchers have long known that the vestibular apparatus of the inner ear, which controls body balance and eye orientation, is largely responsible for motion sickness. When this part of the inner ear is destroyed, motion sickness does not occur, even when a person is aboard rolling, pitching and

heaving ships, or spinning and rolling aircraft; but when a person with an undamaged inner ear is subjected to such stress, he may not be able to adapt, and may react with nausea, vomiting, and sometimes severe spatial disorientation.

Navy investigators have learned that emotional states such as anxiety can contribute to disabling motion illness, but they have also found that what seem to be causes may actually be effects: motion sickness itself produces emotional states such as lowered motivation and morale, and even depression in some people. When so affected, a man may neglect his routine duties and disrupt a crew's efficiency.

Seasickness—the focus of experiments at the Office of Naval Research Facility in Goleta, Calif., for the last three years—has been an



Artist's drawing of slow rotation room



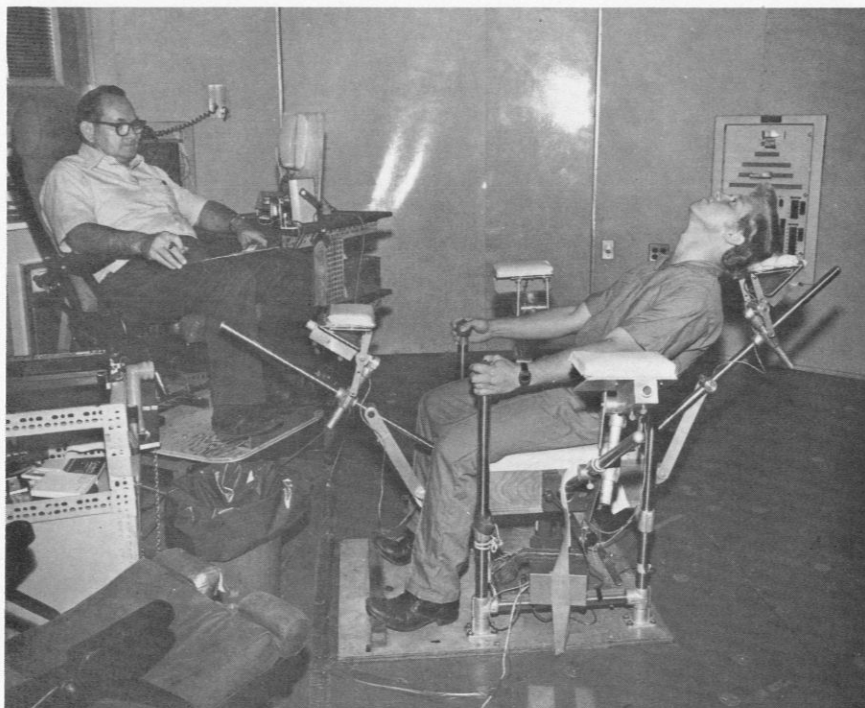
Getting set for motion adaptation studies in off-vertical rotating chair.

occupational hazard in the Navy since its first ship set sail. The recent advent of ships that can travel up to 100 miles an hour intensifies the problem. At Goleta, scientists use a simulator to expose volunteers to different kinds of ship motion, and can relate seasickness to wave frequency and height. From these studies, they have devised a mathematical model to predict the degree of motion sickness caused by simple wave motion. Further investigations are under way on the effects of complex ship motions in different sea conditions.

Why one man gets motion sickness while another does not is one of nature's mysteries. While researchers are finding that certain physiological and psychological characteristics may predispose some people to motion sickness, fear does not seem to be a common factor. For example, some people who admit they are afraid to fly do not suffer from airsickness, while simulated flight in the laboratory may produce motion sickness in the fearless subject.

At the Naval Aerospace Medical Research Laboratory, Pensacola, Fla., researchers have been studying the connection between airsickness and spatial disorientation since 1945. Many motions that cause spatial disorientation also induce motion sickness. By studying why this happens, Pensacola scientists expect to develop a general mathematical model for predicting the incidence of motion sickness in any conditions.

Spinning. If researchers don't expect to find a way to cure airsickness, they do believe they can reduce susceptibility to it. At the Pensacola lab, volunteers who have suffered from airsickness in the past spend several days in a specially designed room, performing repeated head movements while the room spins. The degree of sickness they experience is controlled by the room's rotation speed, so that the degree of motion can be finely tuned to the individual's tolerance. As the volunteer adapts to the rota-



Volunteer aboard coriolis acceleration platform in rotation room

tion, the room is moved faster until he can comfortably tolerate speeds that formerly made him sick. How well this adaptation protects him from airsickness, how long it lasts, and how often it must be repeated is the subject of continuing research. But so far this method has successfully reduced motion sickness in most volunteers treated.

Research teams at the Pensacola and Goleta labs are also studying drugs to treat and prevent motion sickness. The news on most of these drugs is mixed: although they reduce nausea, they produce side effects like drowsiness that would seriously handicap a sailor in combat. Navy researchers have been able to reduce these side effects somewhat by introducing drugs through the skin. For instance, when a patch soaked in scopolamine is worn behind the ear, the drug is absorbed through the skin and prevents motion sickness for up to 18 hours with few side effects. Some tranquilizers effectively prevent motion sickness; so do some stimulants, but not as well as tranquilizers. Particular drug combinations such as promethazine and ephed-

rine work well together: the stimulant, ephedrine, reduces drowsiness caused by the tranquilizer, promethazine. The effectiveness of particular medications differs between people—a combination of scopolamine and amphetamine may work best for one person, while ephedrine and promethazine work best for another.

The Navy may soon be able to predict motion sickness incidence in new ships and aircraft, and to reduce the incidence of motion sickness with preselection (choosing crewmembers with good motion tolerance to serve on fast ships), preadaptation, and controlled use of medication. Researchers are even thinking of isolating the crew's living and working spaces from the rest of the ship with a suspension system, thus dampening the transfer of ship motion to these separate spaces. It's the same concept that's used in automobiles: the chassis is suspended on the wheels to eliminate vibration inside the vehicle.

All of this news should comfort many Navy sailors and aviators who have suffered *mal de mer* and *mal de l'air* long enough.

Promotion Slowdown

Stiffer promotion criteria for medical and dental officers were announced in Department of Defense Directive 1320.7 of 8 July 1976, and in a "Dear Doctor" letter from the Surgeon General.

Until now, promotion opportunity to the grades of 0-5 and 0-6 for medical and dental officers has been 90% of the primary zone; in addition, a smaller group of officers—equal to 10% of the number selected in the primary zone—could be chosen from below the zone.

But under the provisions of the revised directive, no more than 80% of medical and dental officers in the primary zone may be promoted to 0-5, and no more than 75% of such officers may be promoted to 0-6.

Up to 10% of medical and dental officers recommended for promotion to 0-5 and 0-6 can come from below the primary zone; however, selectees from above or below the zone will now be included in the maximum number of officers that can be selected for promotion.

Above and below zone selectees will therefore reduce the number of officers who may be chosen from the primary zone.

These changes affected the recommendations of captain selection boards that met last July. When the medical officers' captain selection board met, 60 eligible medical officers were in the primary zone, of whom 75%, or 45, could be promoted under the new policy. Forty-one of the 45 possible promotions were selected from the primary zone; another 4 were selected from above the zone. No medical officers were promoted to captain from below the zone, although in previous years from three to five such candidates have usually been selected.

Of 29 dental officers in the primary zone for promotion to 0-6, the July dental officers' captain selec-

tion board selected 20 candidates from the zone and one from above zone, for a total of 21 selectees. Again, no dental officers were promoted to 0-6 from below the zone.

There has been no change in promotion opportunity to 0-4: all fully qualified, eligible medical and dental officers may still be promoted.

More restricted. In grades 0-4 through 0-6, promotion eligibility will become more restricted over the next six years—from FY77 to FY82. Currently, to be eligible for promotion, medical and dental officers must either accumulate a designated minimum number of years of promotion grade credit* or com-

active-duty service as an 0-3 medical or dental officer. By FY82, a lieutenant will have to have ten years of promotion grade credit or six years of active-duty service in grade 0-3 to be promoted.

For the first time, medical and dental officers appointed in the grades of 0-4 and 0-5 and considered eligible for promotion to 0-5 and 0-6 respectively must meet a minimum active-duty requirement of at least 12 months of continuous active-duty service in the next lower grade. This requirement must be met before the convening date of the selection board.

These changes will reduce the number of medical and dental officers in higher grade levels, bringing their promotion patterns more into line with promotions for Medical Service Corps, Nurse Corps, and line officers. Currently, a maximum

New Promotion Eligibility Requirements

To Grade	FY77	FY78	FY79	FY80	FY81	FY82
0-3	4/1*	4/1	4/1	4/1	4/1	4/1
0-4	8½/4½	9/5	9½/5½	10/6	10/6	10/6
0-5	13½/5	14/5	14½/5	15/5	15½/5½	16/6
0-6	20½/7	21/7	21½/7	22/7	22/6½	22/6

*The first figure is the number of years of promotion grade credit required for promotion to the grade indicated. The second figure is the required minimum number of years of active duty service in the next lower grade. To be eligible for promotion, a medical or dental officer must have one of these two types of credit.

plete the minimum years of active duty as a medical or dental officer in the next lower grade, computed from date of rank.

Under the new policy, the promotion grade credit and minimum active-duty service required for promotion to 0-4, 0-5 and 0-6 will gradually be increased (see chart). For example, to be eligible for promotion to 0-4 in FY77, a lieutenant must have either 8½ years of promotion grade credit or 4½ years of

of 60% of eligible Medical Service Corps, Nurse Corps, and line officers in the primary zone can be selected for promotion to captain; any officers selected from below or above the zone must be included in that maximum of 60%. For promotion to commander, up to 70% of Medical Service Corps, Nurse Corps, and line officers in the zone may be selected.

Medical and dental officers who would like to discuss their promotion prospects may call the personnel actions branches of the Medical Corps and Dental Corps Divisions at the Bureau of Medicine and Surgery. Medical officers should call (Area code 202) 254-4390, or Autovon 294-4390; dental officers, (Area code 202) 254-4189 or Autovon 294-4189.

*Promotion grade credit = entry grade credit + years of continuous active duty as a medical or dental officer + one year of constructive service credit for board certification, if applicable. Entry grade credit is awarded for prior active-duty commissioned service and for professional education and experience.

BUMED SITREP

FLEET LIAISON . . . The medical/dental fleet liaison concept is gaining momentum at naval regional medical and dental centers and clinics. In Guam, the dental records of crewmembers are reviewed when a ship arrives, and the men are assigned priorities for treatment; a bus is dispatched to pick up patients at the pier and take them to the dental clinic where they are treated and returned to duty with minimum lost man-hours. In Subic Bay, Republic of the Philippines, dental appointments for shore-based personnel are delayed when necessary to ensure that fleet personnel can be accommodated; the Serv Mart (Med Mart) supply system also supports Medical Department representatives who arrive by ship.

In the Puget Sound area, a fleet liaison team (two medical officers, a Medical Service Corps officer, and a chief hospital corpsman) visits each arriving ship to brief the ship's company on available services. Also, NRMC Bremerton established a fleet sick call unit within the industrial dispensary in Puget Sound Naval Shipyard; supporting this unit are three hospital corpsmen and a physician's assistant who have direct access to all clinical specialties.

Environmental and Preventive Medicine Unit No. 6 in Pearl Harbor provides the fleet with industrial and environmental hygiene, pest control, and special laboratory and epidemiology support. EPMU-6 and EPMU-5 in San Diego both conduct special classes in shipboard health problems for ships' commanding officers and executive officers.

Representatives of the Naval Environmental Health Center are frequent shipboard consultants for industrial hygiene and environmental medicine. Also, the Disease Vector and Ecology Control Centers at Jacksonville, Fla., and Alameda, Calif., provide support for special pest control problems aboard ship.

NRMC OKINAWA . . . The Secretary of the Navy has approved the establishment of U.S. Naval Regional Medical Center, Okinawa, Japan, in a development status effective 1 October. The medical center—formerly U.S. Army Hospital Kuwae, Okinawa—will become fully operational on 1 March 1977.

OVERSEAS ASSIGNMENTS . . . Medical Department personnel with more than three dependents will not be assigned to overseas duty (including Alaska and Hawaii) with their families unless an urgent requirement exists. The new policy, announced in BUPERS Note 1306 of 1 Sept 1976, is expected to ease the shortage of funds for permanent change of station moves. The change will also help ease the pressure on crowded schools, housing, and hospitals at some overseas stations.

PROJECT READINESS . . . Effective 1 January 1977, the 83 Reserve Naval Regional Medical Center reinforcement units that have been the main strength of the Naval Reserve medical program over the past two years will be disestablished. In their place will be Marine ground and air units, five units to support the hospital capability of USS *Tarawa* (LHA-1), two units representing small advanced base hospitals, and 20 surgical teams. The eight preventive medicine units will remain, each with one additional Medical Service Corps officer (NOBC 0802).

All officer billets will probably be Category A. There have been substantial billet reductions in NOBC 2105, 2305, and 2905. There is a slight increase in hospital corpsmen.

These changes will be implemented under the title *Project Readiness* in response to the OP-605 Study of the Size and Structure of the Naval Reserve.

Look for a complete description of this new program in future issues of *U.S. Navy Medicine*.

OCULAR VITREOUS SURGERY . . . Surgery of the ocular vitreous is now available at the National Naval Medical Center. Vitrectomy may be considered as a surgical means to restore the obscured optical pathway. Vitreous surgery may be appropriate in the following conditions:

- Vitreous hemorrhage secondary to venous occlusions, diabetes mellitus, Eale's disease, sickle cell disease, and trauma.
- Opacities which occur with amyloidosis and chronic uveitis.
- Proliferative vitreal membranes and strands.

- Subluxated lenses secondary to Marfan's syndrome or trauma.
- Reconstruction of the anterior segment of the eye and removal of pupillary membranes.
- Diagnostic biopsy in certain cases of uveitis.
- Non-magnetic foreign bodies.
- Persistent primary hyperplastic vitreous.
- Congenital cataracts.
- Bullous keratopathy secondary to vitreous touch.
- Retinal detachments with large giant tears or associated with a large amount of vitreous traction.
- Vitreous traction secondary to trauma or surgical wounds.
- Hemolytic glaucoma.
- Aphakic pupillary block glaucoma.
- Epithelial downgrowth.

When vitrectomy is considered, the patient should be referred within two weeks of the original ocular injury if no other injuries preclude travel. Contact the NNMOC Ophthalmology Service before referring a patient for possible vitreous surgery.

CARE FOR PRISONERS . . . It is the policy of the Department of Defense to protect the rights and health of U.S. military personnel detained in foreign penal institutions. These members are not discharged or separated from the service until they complete their term of imprisonment and return to the U.S. During their confinement they remain health care beneficiaries. SECNAVINST 5820.4D directs designated commanding officers to ensure that, when necessary and feasible, U.S. military personnel confined in foreign penal institutions within their areas of responsibility are provided with medical and dental treatment. Such treatment will not exceed the type and quantity of care furnished prisoners in U.S. military confinement facilities.

DENTAL COMMAND . . . Naval Regional Dental Center, Orlando, Fla., was established 1 October, created from the Orlando Naval Training Center dental department and dental personnel from Naval Regional Medical Center, Orlando. The first commanding officer of the 27-chair dental center is CAPT H.C. Pund, Jr. (DC).

NAVMED Newsmakers



LCDR Sherman: Classic costume

At a reception honoring the Dental Corps' 64th anniversary last August, LCDR **Robert L. Sherman** (DC) showed up in uniform—but not the one you'd expect. Blending in with and enlivening decorations depicting the history of Navy dentistry, LCDR Sherman sported the uniform worn by Navy dental officers from 1913 to 1918. Where'd he get this classic costume? Only the Dental Corps knows for sure. . . .

When he joined the Navy, **Craig Connor** thought he might like to be a photographer. Instead he became a hospital corpsman, working with a different kind of film. "I'm glad I got into the Hospital Corps," says HM3 Connor today, who sometimes reviews X-ray films as part of his duties at Branch Clinic San Miguel, Republic of the Philippines. "It's a rewarding experience being able to help people." It's a lot of responsibility, too. "The first night I was on night watch in a ward with patients on heart monitors and IVs, I thought maybe the Navy had given me too much responsibility," HM3 Connor recalls. "I was only 19 years old. But I did all right. In the Navy you either make it or you don't. You have to be mature enough to accept the responsibility."

At least one new Navy nurse already knows all about the Navy family—she grew up in it. So when **Pamela Ryan** graduated magna cum laude from Duke University and was ready to take the oath of office, what better officiator than her father, LCDR **William A. Ryan** (MSC), officer-in-charge of Branch Clinic, Naval Air Station, Atlanta. Now she's ENS Ryan, assigned to NRMCC Camp Lejeune, where she makes full use of the training she received under the Navy Nurse Corps Candidate Program.

ENS **John R. Dunlap** (NC) scored a first when he graduated from West Virginia University School of Nursing earlier this year: the former hospital corpsman became the first male inducted into Sigma Theta Tau, the national nursing honor society. His wife Elynn—a former Navy nurse—earned her bachelor's degree at the same time, making the Dunlaps the first husband-wife team to graduate from the school.



LCDR and ENS Ryan



HM3 Connor: Different film

Neophyte hospital corpsmen sometimes have unusual backgrounds, but HA **Brian P. Van Buren**'s past is flashier than most. Now a student at Hospital Corps School in San Diego, the 25-year-old corpsman edited a newsletter for his congressman, helped California migrant workers as a VISTA volunteer, and worked with handicapped and emotionally disturbed children before going Navy. HA Van Buren is sure he'll find the Hospital Corps as challenging as his former lines of work—and in the same tradition of helping others.

Bringing honor to Navy medicine recently were CDR **John P. Swope** (MC), elected to a one-year term on the executive board of the Health Care Section, National Fire Protection Association . . . LTJG **David A. Percival** (DC), winner of the Officer Indoctrination School's honor award given to the graduate with the highest grades . . . ENS **Lawrence Ludwig** (DC), winner of the Officer Indoctrination School's leadership award . . . HM2 **Merriam E. "Micki" Johnson** and HM2 **Keith E. Dixon**, named Outstanding Enlisted Members of the Year by the Pensacola (Fla.) Council of the Navy League.

Features

What's a Veterinarian Doing Here?

CAPT James H. Wright, USAF, VC

If you think saltpeter in your food is bad, how about embalming fluid? During the Spanish-American War, the U.S. Army contracted with an American meat packer to deliver meat to fighting troops in Cuba. Unable to keep the meat in good condition during the trip, the packer let his desire for profit override his pride in providing a quality product, and began to preserve the meat with embalming fluid.

Needless to say, the Army was displeased with this unorthodox practice, and ordered military veterinarians to inspect all meat purchased from private packers. Until then, the veterinarians' primary mission had been to keep the Army's horses and mules healthy; now, for the first time, they were responsible for safeguarding human health. Today, preventing human diseases is the military veterinarian's first concern.

The Navy does not maintain its own veterinary corps—probably because this sea-going service never had enough animals to justify acquiring veterinarians. But the Navy still benefits from military veterinary medicine through special arrangements with the Army and Air Force, each of which lends the Navy about the same number of veterinarians.

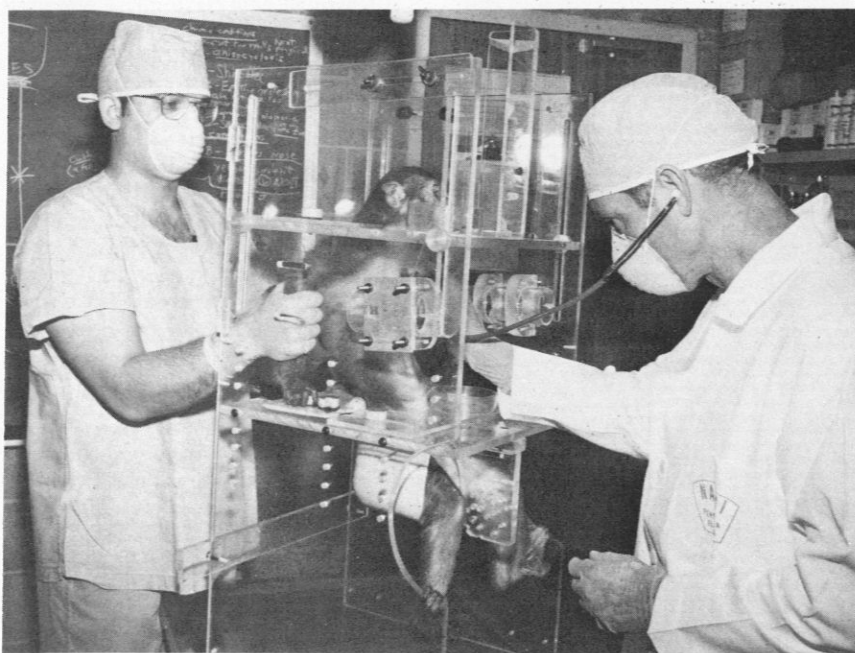
The 41 Air Force veterinary officers and 86 Air Force enlisted veterinary technicians attached to Navy

and Marine installations fill two types of billets: research and general base support. Ten Navy research laboratories are assigned Air Force veterinarians, most of whom have postdoctoral specialty training—and usually board certification—in such fields as laboratory animal medicine, veterinary pathology, physiology, microbiology, surgery, and marine biology. Research veterinarians ensure that the Navy buys only animals appropriate for its research projects. As new animals arrive at a research facility, they are quarantined until the veterinarian is convinced they are healthy. His examination includes blood counts, fecal bacterial cultures, tests for tuberculosis and intestinal parasites, and immuniza-

tion; only then are the animals con-

sidered satisfactory research specimens. After animals join the research colony, the veterinarian provides routine health care and immunizations, and evaluates their nutrition and housing, helping the Navy comply with U.S. Department of Agriculture regulations governing their care. During the research project, the veterinarian may perform surgical procedures, prepare animals for experiments, restrain them during the procedure, collect specimens and analyze data.

Dental research. Air Force veterinarians serve as principal or associate investigators on various Navy projects. In dental research, they participate in the study of tooth transplants, artificial tooth root systems, periodontal disease, and heal-



HM3 John Clayton (left) assists veterinarian

CAPT Wright is an Air Force veterinarian stationed at the Naval Aerospace and Regional Medical Center, Pensacola, Florida 32512. He thanks COL Edward Menning, USAF, VC and LTCOL James Kupper, USAF, VC for their help in preparing this article.

ing of gingival wounds—and they are helping to develop a vaccine against *Streptococcus mutans*, the major causative organism involved in dental caries.

Other Navy-oriented research in which Air Force veterinarians participate includes the study of:

- influences of hyperbaric and hypobaric pressure, to determine the risks of nitrogen bubble emboli when an aviator skin-dives one day, flies the next.
- long-term effects of skin diving on bone health.
- treatment of thermal burns with allograft skin transplants.
- use of antilymphocyte serum to reduce disease in bone marrow transplants.
- use of hyperthermic fluids to treat hemorrhagic shock.
- use of homografts and autografts of cancellous bone.
- effect of electrolyte imbalances on the physiology of exercise.

Many Navy research projects focus on marine mammals to determine why they function more efficiently than human divers in the same environment. Investigators are studying the immune mechanisms of marine mammals, the diseases they transmit to humans and other land animals, and the effect of pollutants. Researchers are also trying to relate peptic ulcers in marine mammals to peptic ulcers in humans. From these projects may come a better therapeutic regime for divers.

Another group of 23 veterinarians maintains a food inspection program, and helps prevent the transmission of diseases from animals to man. Veterinary technicians inspect food for fitness for intended use, compliance with contracts, and most important, wholesomeness. Poultry products can be contaminated with *Salmonella* organisms at the farm or processing plant: fresh chickens that have been warm enough to allow these bacterial con-

CAPT Wright visits a "patient" at Naval Aviation School Command land survival facility



taminants to reproduce are unacceptable. So are eggs that have small cracks. Swollen cans of food are rejected, too: they may have been improperly processed, and may contain the toxic *Clostridium botulinum*.

Lean hamburgers. Because the military buys food in such large quantities, contract compliance is essential. For instance, hamburger containing 80% lean meat is considerably more expensive than hamburger with only 75% lean meat; if the Navy gets a lesser grade than it pays for, a lot of money is wasted—especially when some 10,000 pounds of meat are involved. The same goes for eggs which are not as high a grade as ordered, or milk with less than the specified amount of fat. In the case of milk, a medical problem may result: if skim milk, which supposedly contains less than 0.5% milk fat, is replaced by milk with 2% fat, people on a low-fat diet could be harmed. Sometimes packers do not adhere to the contract's weight and quantity requirements. A galley cook would have his menu ruined if, on opening a box that should contain 100 eight-ounce steaks, he found only 80 ten-ounce steaks. The dismayed cook would have to scrounge for the last 20 dinners.

Inspectors use more than just their five senses to determine contract compliance. They closely monitor food temperature and weight, candle eggs to check their grade, determine the percent of fat in ground meat, and perform pH tests on oysters. Often the veterinary inspector sends food samples to an Army medical laboratory for further tests. Bacterial counts indicate the quality of raw materials, cleanliness of the processing plant and the presence of contamination. If a food item is not acceptable, the inspector recommends that it be rejected. Occasionally, if an urgently needed product has a minor defect not involving wholesomeness, it may be approved. In such cases a price adjustment is usually negotiated with the supplier. In 1975,



Food inspection program helps keep Navy families healthy

Air Force veterinarians at Navy bases inspected food valued at \$317,524,000. On their recommendation, \$1,526,000 worth of food was rejected, and price adjustments of \$188,000 were obtained.

The Air Force veterinarian plays an important role in controlling and preventing zoonotic diseases on Navy bases. If an animal bites a military person, for example, the veterinarian will often handle the quarantine and investigation to determine whether the animal has rabies. His opinion of the circumstances of the bite and of the animal's condition can help physicians decide whether the patient should undergo rabies prophylaxis.

In zoonoses control clinics, veterinarians examine the pets of military families. (Except for a limited number of sterilization procedures, no elective surgery or treatment of nonzoonotic conditions is performed.) By examining and treating household pets, the veterinarian can help prevent or diagnose diseases in family members. One example: hookworms and roundworms—common parasites in dogs—cause cutaneous larval migrans and visceral larval migrans in humans. The veterinarian can alert a family to the danger of its pet's staphylococcal dermatitis or ringworm—diseases the pet can pass on to children.

The veterinarian can point out conditions that many people mistakenly believe can be contracted from animals. Children do not acquire pinworms from their animal friends, for example; nobody acquires *Phthirus pubis* from animals, and the virus of canine hepatitis differs from the virus which causes human infectious hepatitis.

The base veterinarian provides acute and preventive care for a surprisingly large number of government-owned animals on naval installations, from dogs trained to detect drugs or bombs to raccoons at wildlife exhibits. To children living on base, the veterinarian is the one who may help find their lost dog or mend a bird's broken wing. He can tell the family being transferred overseas how to get Fido or Morris transferred too, or reassure the worried mother whose child has been bitten by the neighbor's dog that her child's health is being safeguarded.

Usually, the veterinary officer finds a tour with the Navy enjoyable and enlightening—a chance to meet warmhearted people ready to help an outsider adjust to Navy life.

There is one other thing Air Force veterinarians do on a Navy base: at least three times a week, they answer the question, "What is an Air Force veterinarian doing on a Navy base?"

Enlisted Scene

Board Investigates Petty Officers' Performance

Every Medical Department petty officer whose duty as reporting senior requires the preparation of enlisted performance evaluation reports should study the results of the recent Petty Officer Quality Control Review Board as reported in NAVOP 102/76 (211355 August).

The Board examined the records of 3,220 E-5 and E-6 personnel whose performance had been below standard because of alcohol abuse, behavior detrimental to naval service (including drug abuse), obesity, financial irresponsibility, poor leadership, or failure to support the Navy's equal opportunity goals. The Board recommended 1,666 actions involving 1,396 individuals—about 1% of E-5 and E-6 personnel (see chart).

Personnel affected by actions recommended by the Board and approved by the Chief of Naval Personnel will be notified by their commanding officer. Remedial action will be recommended. These members will be required to acknowledge in writing that they have been informed of the Board's recommendations and counseled on the seriousness of the warnings. Unless their performance improves to a satisfactory level during the probation period, more stringent actions can be expected.

The records of personnel who receive a warning letter without a reenlistment or extension restriction will be reviewed again in FY77. Members who receive letters with a reenlistment or extension restriction cannot reenlist without the approval of the Chief of Naval Personnel.

Renewed emphasis has been placed on weight control and support of the Navy Equal Opportunity Program. The Board also reemphasized the need for care in preparing performance evaluations, and for following Navy standards when recommending personnel for promotion, reenlistment, or transfer overseas. Common errors the Board noted:

- Evaluations contained "unsatisfactory-serious" and "unsatisfactory-minor" marks which were not justified in the narrative section.
- On some records, a significant decline in performance was indicated by progressively lower marks but was not discussed in the narrative section.
- Some members were reenlisted or advanced even though such action had not been recommended in the previous evaluation.
- Some commands reenlisted or advanced an individual, then 30 days later evaluated his performance as totally unsatisfactory.
- Some marginal performers, given

a substandard evaluation upon discharge and not recommended for reenlistment, mistakenly received a reenlistment code (RE-1). The discharged member then went to the nearest recruiting office and reenlisted.

- Some commands certified a person eligible for overseas duty, then gave him an unsatisfactory transfer evaluation, mentioning such problems as excessive use of alcohol, unreliability, and family discord.

As personnel records are converted to microfiche and extraneous material eliminated, the enlisted performance evaluation is becoming the single document upon which promotion, screening and quality control review boards base their recommendations. It is crucial that each performance evaluation be comprehensive, providing a meaningful basis for comparison with other enlisted members. Individual achievements as well as specific problem areas should be clearly described in the narrative comments.

The E-5 and E-6 review board, part of the Navy's Personnel Quality Control Program, has taken the first step in identifying and warning personnel whose performance needs improvement. It is now a leadership responsibility to assist them in becoming productive petty officers. If they do not measure up, it is equally important that their performance be fully documented to support subsequent administrative action. Careful preparation of evaluations will ensure that personnel recommended for advancement or reenlistment meet the required performance standards, and will help identify members who have not carried their share of the load in the past and who do not demonstrate the capacity or inclination to share the leadership burden of the future.

All enlisted personnel and command members who prepare enlisted performance evaluation reports should read NAVOP 102/76. Copies are available from command administrative and personnel offices.

Recommendations of Petty Officer Quality Control Review Board

Recommended Action	Total No. Actions Recommended	Actions Involving HM's	Actions Involving DT's
Administrative discharge	13	—	—
Invitation to Fleet Reserve	17	—	—
Reduction in rate	7	—	—
Warning letters with reenlistment restrictions	735	30	3
Warning letters without reenlistment restrictions	570	16	3
Referral to Alcohol Review Board	132	5	1
Referral to Obesity Control Section, Bureau of Naval Personnel	174	26	—
Referral to Equal Opportunity Section, Bureau of Naval Personnel	18	1	—
Total	1,666	78	7

Soundings

Let's Stop Prescribing Cold Medications

CDR Arnold L. Gorske, MC, USN

One of the first duties of the physician is to educate the masses not to take medication.

Sir William Osler

Cold medicines are routinely dispensed to military personnel and their dependents. At some military medical facilities, nonprescription "cold packs" are available on request; at others, the patient must first be evaluated by a physician, and the medicine prescribed. In either case, the practice of providing patients with these medications is rarely questioned.

But many other providers of health care take a different approach. The Canadian Government and the Kaiser Permanente prepaid health care program, for example, do not dispense free oral decongestants and cold medications. Patients who want such medications may purchase them "over-the-counter," without a prescription.

The question of whether to provide patients with cold medications is particularly pertinent to the pediatric service of a hospital. At the Naval Regional Medical Center Long Beach, Calif., for example, more patients with colds are seen on the Pediatric Service than on any other service. But our ability to handle this workload is hampered by a shortage of physicians and

nursing personnel. To provide better care for our patients, we reviewed what the literature had to say about the effectiveness of cold medications, and studied our procedures for treating colds and prescribing cold medications. In this paper I will discuss the results of our studies, and recommend what we believe is a more effective way to deal with the problem of dispensing cold medications.

REVIEW OF THE LITERATURE

The pediatric literature contains many reports on the effectiveness of cold medications, but few good, controlled studies. Diehl (1) reported that 35% of patients treated with a lactose placebo indicated definite improvement of their cold symptoms; an additional 31% reported questionable improvement.

In a review article in 1975, Lampert et al (2) concluded that "one cannot presently recommend on a rational basis the routine use of decongestants in upper respiratory infections." And, after reviewing all pertinent studies listed in the *Index Medicus* from September 1947 to 1975, West et al (3) concluded that "there appears to be little valid evidence that antihistamines have any effect on the common cold."

These conclusions are supported by the *Nelson Textbook of Pediatrics* (4):

Most available preparations combine antihistaminics and a phenylephrine-like agent. There is little doubt that, in many patients, the atropine-like action

of the antihistaminic causes some drying of mucous membranes; little evidence exists that mucosal shrinkage is produced in a majority of children or that otitis media is prevented.

Rowe (5), in his recent report on acute suppurative otitis media, said:

Sympathomimetic agents and antihistamines are given frequently because of the possibility that they diminish eustachian tube obstruction [6]. However, their value in the treatment of acute otitis media remains unproven [7,8].

Bluestone and Shurin (9) also reported that "Antihistamines and decongestants are often used for otitis media and effusions but there is scant evidence for their effectiveness." And Roger Boles, M.D., chairman of the Department of Otolaryngology at the University of California School of Medicine, San Francisco, reports that on his service oral decongestants and antihistamines are no longer recommended routinely in the treatment of chronic serous otitis and otitis media (10). Even the *Year Book of Pediatrics* notes that "It is upsetting for pediatricians to be told what they have always known, namely, that oral decongestants probably are of benefit only to the drug manufacturer" (11).

West et al (3) claim that antihistamines not only may be ineffective in treating colds, but may be harmful:

Katz, in a statement before the Senate Select Committee on Small Business, noted that antihistamines may thicken secretions in patients with a cold and bronchial cough, and efforts to

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The author thanks the chief of the NRMCLong Beach Pediatric Service and the pediatric staff for their support, and Mrs. Dorothy Perry for technical assistance.

raise secretions would be more difficult [12]. The authors of the *AMA Drug Evaluations* also warn of this problem and add, "... the drugs may have an atropine-like drying effect leading to inspissation of sputum" [13]. Katz and others also warn against the sedative properties of antihistamines [12-14]. ... Instances have been reported of patients on antihistamines falling asleep at work, while operating machinery, or while driving automobiles. The prescribing of any chemical for ingestion carries certain risks which should be weighed against possible benefits.

Medical authorities have harsh words, too, for cough medicines. The *Nelson Textbook of Pediatrics* (4) advises:

If the child is coughing but has a profuse nasal discharge, potent antitussives should be avoided. Depressing the cough reflex may greatly increase the danger of aspiration of material from the nasopharynx.

Earlier this year, the *Wall Street Journal* (11 Feb 1976, p 8) reported that preliminary findings of a Food and Drug Administration advisory panel showed "six expectorants weren't safe or effective enough for continued use . . . [and] additional study was needed on the effectiveness of glyceryl guaiacolate. . . ."

The authors of *AMA Drug Evaluations* (13) also find little or no evidence for the effectiveness of cold and cough preparations, and report that many of the most frequently prescribed medications are "irrational mixtures."

Even though the literature does not rule out the possibility that cold medications may reduce symptoms in some patients some of the time, physicians might do well to consider whether cold medications should be prescribed at all. Are the possible benefits patients might obtain from cold medications worth the risk of possible harmful effects? Do Navy families overemphasize the importance of cold medications, seeing them as a cure-all for sniffles, sore throats, and upper respiratory tract infections? How much does it cost to provide free cold medications? Can the Navy justify spending money for

medications that have not been proven to be effective, and may even be harmful?

PEDIATRIC CLINIC USE

With these questions in mind, we studied the dispensing of cold medications at NRMCLong Beach—first in the Pediatric Clinic and then throughout the medical center.

Pediatricians at NRMCLong Beach spend approximately 40% of their clinic time evaluating upper respiratory tract infections. This is, of course, an essential service since it is often impossible for parents to determine if their child has "only a cold" or something more serious. Most military families, however, expect military pediatricians to prescribe cold medication, and obtaining this medication is sometimes the only reason for their office visit.

In our first study, we evaluated appointments scheduled specifically to obtain cold medicines. Parents are encouraged to call our Pediatric Clinic for "acute care" appointments when their child is ill. Nursing personnel screen these calls and obtain a complete history of the child's present illness. If either the parent or the nurse believes that the child needs to be seen by a physician, an appointment is scheduled for the same day. But if the appointment is requested specifically to obtain cold medicines, the nurse first discusses symptomatic treatment with the parents over the telephone, and informs them of the availability of over-the-counter preparations. If the parents still wish to see a physician, an appointment is scheduled.

In our study, we asked Pediatric Clinic nurses, corpsmen, and civilian nursing assistants to record 100 consecutive phone requests for appointments made specifically to obtain cold medicines. We made no attempt to standardize or alter individual interviewing techniques or recommendations.

Although our study was done in June, when few viral illnesses occur, at least 7% of all Pediatric

Clinic appointments were made specifically to obtain cold medicines. We found that the screening procedure did not significantly reduce the number of appointments that were scheduled. Of 100 requests, 78 were given appointments: 52 of these parents specified that they wanted cold medicines; 26 parents gave other reasons for requesting the appointment.

Nursing personnel with extensive pediatric experience were not significantly more successful than less experienced personnel in reducing the number of appointments. The screeners reported that parents seemed to be dissatisfied with their recommendations about 66% of the time.

Discussion: Our survey confirmed our belief that a significant number of Pediatric Clinic appointments are made for the sole purpose of obtaining cold medicines. Screening calls does little to reduce the number of such appointments, even when experienced nursing personnel perform this task. Further studies are needed to determine the actual cost of the physician and nursing personnel time required to handle these appointments.

The possible adverse effect that prescribing such medications has on the quality of health care should also be studied. For example, use of oral decongestants commonly causes irritability and excessive drowsiness. While many parents stop giving their child cold medications when these symptoms develop, others are not aware that the child's fussiness, hyperactivity, and inability to sleep may be caused by the medicines; if they continue giving their child cold medicine, a minor illness may become a significant problem for parent and child. Pediatricians, too, may have trouble determining the seriousness of some side effects: irritability and excessive drowsiness, for example, may be the result of taking cold medications—but they may also be indications for a lumbar puncture.

Other questions trouble pediatricians: How many simple but proven

treatments—such as bed rest, tepid baths, fluid intake, tender loving care, and appropriate dosages of aspirin or acetaminophen—are neglected because of inappropriate emphasis on cold medicines? How many children accidentally ingest cold preparations and must be treated in the emergency room? How many teenagers experiment with drugs because they are accustomed to receiving medication whenever they don't feel good?

In the NRMC Long Beach Pediatric Clinic, we no longer routinely prescribe cold medications. Pediatricians continue to recommend oral antihistamines and decongestants to treat allergy or allergy-related problems; usually Chlortrimeton and Sudafed are recommended, both of which are available over the counter. Children who have colds are thoroughly examined, and the parents are then advised to use symptomatic treatment such as rest, fluids, a vaporizer, acetaminophen or aspirin.

We are revising our *NRMC Parents' Guidebook* to give parents more information about how to treat their child's colds and other common illnesses without relying on cold medicines. We have found that military families do not demand cold preparations if they are aware that these drugs have not been proven to be effective. However, there is a need for guidelines and consistency throughout the medical center when prescribing cold medications. Here at NRMC Long Beach, a nurse was physically assaulted by an irate mother who was refused cold medications for her child. The mother, who also had a cold, had been evaluated in our emergency room and given a prescription for a medication available over the counter. When the pediatrician would not prescribe cold medicines for her daughter, the mother struck the emergency room nurse. She justified her action by saying, "My daughter is sicker than I am. I got medicine and she didn't. What's wrong with you people?"

Such violent incidents are rare,

but patient confusion and dissatisfaction are relatively common. These problems seem to be unique to military medicine, where patients expect free cold medicine to be prescribed.

USE BY PHYSICIANS

At NRMC Long Beach, all physicians except anesthesiologists stand the emergency room watch. We asked these physicians to complete a questionnaire to give us some idea of their practices and opinions regarding the use of cold medications, aspirin, and acetaminophen. Thirty-eight of 59 physicians responded.

Prescription cold medications

Responses to the question, "What percent of your clinic time is used for evaluation and treatment of the common cold?" varied from an average of less than 2% among surgeons and subspecialists to an average of 38% for pediatricians.

To the question "Do you write prescriptions for cold medicines when an emergency room patient has a cold?" responses varied from *almost always* to *rarely*. Most physicians replied *often*. (The choices were *almost always*, *often*, *sometimes*, *rarely*, and *never*.)

To the question "Do you write prescriptions for cough medicine for cough due to cold?" responses varied from *almost always* to *never*. Again, most physicians replied *often*.

When asked, "Which cold medicine do you prescribe?" physicians named all preparations in the formulary, including medicines containing codeine.

Physicians were also asked, "Which cough medicine do you prescribe when a patient has a cough due to: (1) a profuse nasal discharge? (2) a tickle in the throat? (3) bronchitis or pneumonia?" Responses to all three questions included decongestants, antihistamines, expectorants, cough suppressants, and codeine.

Ninety-two percent of the respon-

dents reported using prescription medicines as well as over-the-counter preparations to treat colds. Some objected to any policy that would limit the use of these medicines. Others said they would not write prescriptions for cold medicine in civilian practice but feel pressured to do so in military hospitals.

The respondents did not agree on the therapeutic effectiveness of cold medicines. When asked how often these medicines proved to be effective, the physicians' answers ranged from *almost always* to *never*.

In response to the open question "Why do you write prescriptions for cold medicine?" 40% of the physicians reported prescribing cold medicines for reasons other than possible therapeutic effect. These reasons included lack of time to counsel patient, placebo effect, and patient demands.

Discussion: It is difficult to understand why some cold medicines are available only by prescription. We found no evidence in the literature that prescription cold medicines are more effective than medicines available over the counter. Chlortrimeton was recently made available over the counter in the U.S., and in Canada all oral decongestants can be purchased without a prescription. Last February, an FDA advisory panel recommended that diphenhydramine be made available over the counter and that preparations already available over the counter be offered in higher dosages. The panel also recommended that manufacturers be required to provide evidence of the effectiveness of their medicines' ingredients.

The placebo effect of cold medications is well documented (1). But this effect probably does not work with children, most of whom do not understand that they are supposed to respond better to cold medicines prescribed by a physician. In adults the placebo effect might be insignificant because of extensive persuasive advertising for nonprescription medications. Also, it is proba-

bly not advisable to prescribe as placebos medications with possible harmful effects.

Some physicians at NRMC Long Beach reported that patients were better satisfied with a prescription that took only 20 seconds to write than they were with a 10-minute discussion about a medicine's limitations. Asnes and Grebin (15) also reported that more prescriptions are written when physicians have little time to spend with patients. But so long as military physicians write prescriptions for cold medicines, military families will believe that these medicines are important and will expect to receive them. And so long as prescription cold medicines are routinely dispensed, patients must return to the clinic and emergency room when they need a refill.

Recommendations: Our study revealed a lack of consistency and guidelines in the dispensing of prescription cold medicines. Physicians who prescribe cold medications put a stamp of approval on these drugs and lead patients to expect to receive them. But oral decongestants, antihistamines, and other cold preparations have not been shown to be therapeutically effective for treatment of the common cold, and may be harmful. We recommend, therefore, that these drugs no longer be routinely prescribed, and that efforts be undertaken to educate patients to this change in policy.

Over-the-counter cold preparations, ASA and acetaminophen

Physicians at NRMC Long Beach do not agree on the best method of dispensing over-the-counter cold preparations, aspirin, and acetaminophen. These medications are available through prescription, or may be purchased without a prescription at the hospital exchange.

Fifty percent of the physicians who responded to our survey recommended that cold preparations available over the counter should be removed from the formulary. Another 42% believed that these preparations should remain in the

formulary. Eight percent of the respondents gave no recommendation.

Thirty-four percent of the respondents believed that aspirin and acetaminophen should be removed from the formulary. But 63% believed these medications should remain in the formulary, while 3% gave no preference.

Some physicians reported that they refuse to write prescriptions for preparations available over the counter. Most of the respondents, however, said they write such prescriptions "sometimes," and a few write such prescriptions "nearly always."

Discussion: Most physicians at NRMC Long Beach have strong opinions about the wisdom of removing from the formulary cold medicines that are available over the counter. The respondents appeared to be torn between their wish to provide total health care and their wish to prevent inefficiency and unnecessary costs.

It is clear that with the present policy equal benefits cannot be provided for all military families. While all military families get colds and need aspirin and acetaminophen, not all receive these medications free by prescription; depending upon the practice of their physician, some families receive these medications through prescription and others must purchase them over the counter.

The cost to the medical center of dispensing over-the-counter cold medicines by prescription is significant. Although the individual preparations are relatively inexpensive, they account for thousands of prescriptions each month (16). And because over-the-counter medications are routinely dispensed by prescription, many patients do not know they could get the same preparations commercially, often at much less expense and inconvenience.

Recommendations: We recommend that nonprescription oral decongestants, cold medicines, and inexpensive nonprescription drugs

of proven therapeutic value, such as acetaminophen and aspirin, be dropped from the formulary and remain available at low cost in the exchange. This recommendation supports the concept of excellent health care and equal health care benefits for all military families. It also would help reduce costs and save time for physicians and patients.

We invite the comments of our colleagues.

REFERENCES

1. Diehl H: Medicinal treatment of the common cold. *JAMA* 101:2042, 1933.
2. Lampert RP, Robinson DS, Soyka LF: A critical look at oral decongestants. *Pediatrics* 55:550, 1975.
3. West S, Brandon B, Stolley P, Rumrill R: A review of antihistamines and the common cold. *Pediatrics* 56:100, 1975.
4. Vaughan VC, McKay RJ (eds): *Nelson Textbook of Pediatrics*, ed 10. Philadelphia, W.B. Saunders Co, 1975, p 941.
5. Rowe DS: Acute suppurative otitis media. *Pediatrics* 56:285, 1975.
6. Miller GF: Influence of an oral decongestant on eustachian tube function in children. *J Allergy* 45:187, 1970.
7. Rubenstein MM, McBean JB, Hedgecock LD, Stickler GB: The treatment of acute otitis media in children: III. A third clinical trial. *Am J Dis Child* 109:308, 1965.
8. Stickler GB, Rubenstein MM, McBean JB, Hedgecock LD, Hugstad JA, Griffing T: Treatment of acute otitis media in children: IV. A fourth clinical trial. *Am J Dis Child* 114:123, 1967.
9. Bluestone CD, Shurin PA: Middle ear disease in children. *Pediatr Clin North Am* 21:379, 1974.
10. Boles R: Otitis media. Lecture delivered at Advances in Pediatrics Conference, University of California, San Francisco, May 1976.
11. Gellis SS (ed): *Year Book of Pediatrics*. Chicago, Year Book Medical Publishers, Inc, 1976, p 137.
12. Katz S: Statement before the Subcommittee on Monopoly of the Select Committee on Small Business, U.S. Senate, Ninety-Second Congress, part 3, 5 Dec 1973. Washington, D.C., Government Printing Office, 1973, pp 942-943.
13. AMA Department of Drugs: *AMA Drug Evaluations*, ed 1. Acton, Mass, Publishing Sciences Group, Inc, 1971, pp 367-372.
14. Fabricant N: Antihistaminic drugs and the common cold: A critical review. *Am J Med Sci* 220:464, 1950.
15. Asnes RS, Grebin B: Pharmacotherapeutics: A rational approach. *Pediatr Clin North Am* 21:81, 1974.
16. Asche CA, Gorske AL: Dispensing of cold medications. Written communication.

Off Duty

Thanksgiving Story: One Year Later

As Thanksgiving Day draws near, most Medical Department members will be conjuring up images of cranberry sauce and steaming roast turkey. But LT Irene M. Biffar (NC) will be thinking of the Vietnamese family who joined her for Thanksgiving dinner last year—and shared her home while they struggled to start a new life in the U.S.

The story begins in April 1975, when LT Biffar, a nurse at Naval Aerospace and Regional Medical Center, Pensacola, was ordered for temporary duty to Naval Regional Medical Center Guam, to care for Vietnamese refugees during *Operation New Life*. There, she befriended a family of newly arrived refugees, and invited the mother, four daughters and a cousin to share her home in Twin Oaks, Fla.

Thanksgiving Day 1976 will find the family scattered, but thriving. Duyen (now Anna), the mother, at first “seemed impenetrable,” says LT Biffar, “but managed with her “*ti ti*” [Vietnamese for “very little”] English to convey her thoughts and to understand me.” Anna now studies English at Pensacola Junior College.

The eldest daughter, Lien Huong (now Lynn), 28, was formerly a secretary, a third-year law student and administrator of Vietnamese patient affairs at the Guam medical center. On her arrival in the U.S., she found work helping other Vietnamese refugees get settled in Pensacola. She now works as a secretary at a technical college in Orlando.

Lien Buu (now Germaine), 26, is a whiz at assembling and wiring floor lamps, and hanging shades and curtains. The only family member who still lives with LT Biffar, she works as a seamstress and hopes to teach art.

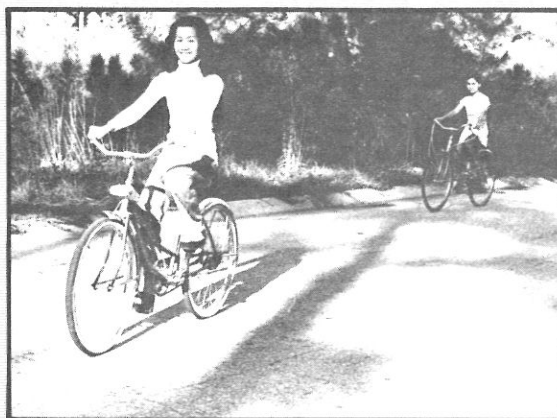
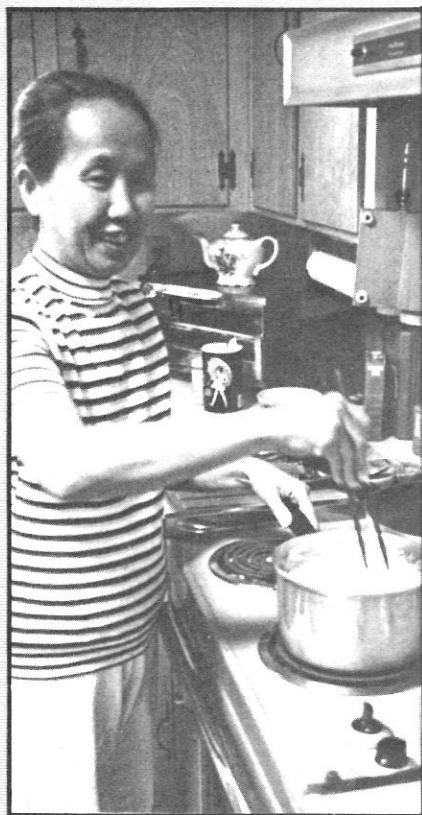
Lien Hoa (now Cathy), 24, plays semiclassical and folk guitar and hopes to teach music; she lives with a friend in Tucson, Ariz.

Lien Dai (now Agnes), 20, an interpreter and student at Pensacola Junior College, teaches English to non-English-speaking students and hopes to become a college English teacher. Agnes lives on campus with her mother.

Cousin Tuyet Le (now Therese), 21, a former philosophy major who speaks fluent French, lives and works on Long Island, N.Y., and plans to be married soon.

As for LT Biffar, she's preparing to spend a year in nurse practitioner training at Naval Regional Medical Center San Diego. Helping the Liens meant financial sacrifice and big changes in her lifestyle, but she has no regrets. “I feel a great satisfaction, and that's reward enough,” she says, remembering her Thanksgiving Day gift to a homeless family.





American scenes: (clockwise from top left) Seven in a VW; Vietnamese cuisine in American kitchen; free-wheeling fun; learning the language; on the job; Thanksgiving Day dinner; the sound of music.

otos by PH2 Elsa Best

Instructions and Directives

Treating gonorrhea and syphilis

For treating uncomplicated gonococcal infections, the drug of choice is aqueous procaine penicillin G, 4.8 million units divided into at least two doses and injected intramuscularly at different sites during one visit. Patients should receive 1 gm of probenecid orally just before the penicillin injections.

When aqueous procaine penicillin is not appropriate and oral therapy is preferred, a combination of 3.5 gm of ampicillin and 1 gm probenecid may be administered by mouth. When the patient is allergic to the penicillins or to probenecid, 1.5 gm tetracycline hydrochloride may be administered by mouth, followed by 0.5 gm of the same drug four times per day for four days (total dosage, 9.5 gm); spectinomycin hydrochloride, 2 gm given intramuscularly in one injection, may also be administered.

Recurrent symptoms are usually due to reinfection or to nongonococcal or postgonococcal urethritis. For nongonococcal or postgonococcal urethritis, the preferred drug is tetracycline, 0.5 gm by mouth four times daily for at least seven days. Resistant postgonococcal urethritis can be treated with tetracycline, 0.5 gm four times daily for up to 21 days.

When symptoms recur because treatment with penicillin, ampicillin or tetracycline fails, spectinomycin, 2 gm given intramuscularly, is the drug of choice. A double dose (9.6 million units) of aqueous procaine penicillin should not be used.

Oral penicillin preparations and long-acting forms of penicillin are not recommended for treating gonococcal infections.

For treating syphilis, the drug of choice is benzathine penicillin G, 2.4 million units given intramuscularly, divided into two doses and injected at different sites during one visit. If benzathine penicillin is not appropriate, an alternative therapy is aqueous procaine penicillin G, 4.8 million units, given in doses of 600,000 units injected intramuscularly every day for eight days. Tetracycline hydrochloride or erythromycin, 500 mg by mouth four times daily for 15 days, may be prescribed if the patient is allergic to penicillins.

Patients with primary and secondary syphilis should be encouraged to return 2, 4, 6, and 12 months after treatment for quantitative nontreponemal tests. Careful follow-up serological testing is particularly important for patients treated with antibiotics other than penicillin.

Retreatment should be considered when clinical signs of syphilis persist or recur, when there is a sus-

tained fourfold increase in the titer of a nontreponemal test, or when an initially high-titer nontreponemal test fails to decrease fourfold within a year. Such patients should be treated with regimens recommended for syphilis of more than one year's duration. Only one re-treatment course is indicated.

Oral therapy with penicillin V or ampicillin is not recommended for treating syphilis.

Recommended treatment schedules for gonorrhea and syphilis, and information on adverse reactions to drugs used to treat venereal disease are included in this notice.—BUMED Notice 6222 of 8 Sept 1976.

Medical/dental support of operating forces

Commanding officers of naval regional medical and dental centers shall establish a fleet liaison office to coordinate the delivery of medical and dental care to members of the operating forces when they are in port or in garrison. The office should be delegated authority to deal directly with chiefs of service, department heads and component activities of naval regional medical and dental centers, as well as with units of the operating forces. A fleet medical and fleet dental liaison officer shall be named, and these officers shall give fleet liaison priority over other duties. The appropriate Navy environmental and preventive medicine unit shall be contacted to assure timely service to operating forces.

All fleet support activities shall be coordinated with the appropriate fleet and type command medical and dental officers. A list shall be prepared quarterly of the names, locations and phone numbers of fleet liaison personnel and sent to appropriate fleet commanders in chief, type commanders, Fleet Marine Force commanders, and BUMED Code 5.—BUMED Instruction 6440.3 of 15 June 1976.

New per diem rates for inpatient and outpatient care

Per diem rates have been revised for hospitalization, outpatient treatment and subsistence at Navy medical facilities. The interagency per diem rate for inpatient care (complete care at government expense) and the full reimbursable rate for inpatient care are now \$168. Interagency outpatient and full outpatient per diem rates are now \$20. In the cost statement of per diem charges, the general rate is now \$99 for hospital services and \$69 for professional services, totaling \$168.—BUMED Instruction 6320.4X, change transmittal 2 of 21 July 1976.

Clinical Notes

Better Pesticides for Submarines

LCDR Robert V. Peterson, MSC, USN
LCDR Donald M. McCroddan, MSC, USN

Control of the German cockroach *Blatella germanica* (L.) in the Navy has been complicated by the conditions created when ships spend many months at sea. Galleys are usually hot and humid, with an abundance of food and many inaccessible places where cockroaches can hide. Sanitation may be poor, and there may be limited time to clean galleys and treat them with insecticides. Often the result is large cockroach populations.

Controlling cockroaches is especially difficult on submarines. Although the same conditions exist that attract cockroaches to surface vessels, submarines are restricted from using pesticides while submerged or when they will submerge within 24 hours. Even when surfaced, submarines may use only water-based pesticides whose vapors do not interfere with air scrubber systems and are not a significant hazard to the crew.

Submarines are not allowed to store the concentrated insecticides that are mixed with water to form a sprayable solution; instead, submarines must rely on tenders and shore establishments to provide the pesticides they need when they surface.

Currently, 1.1% propoxur (Baygon®) may be used as a residual spray aboard submarines (1). But because this material breaks down 24-48 hours after it is mixed with

water, the spray must be prepared from an emulsifiable form of the concentrate before each use.

Some submarines heavily infested with German cockroaches have been fumigated with another chemical, dichlorvos aerosol (DDVP®), which has killed 97% to 100% of cockroaches on board. Dichlorvos does not harm crewmembers or air scrubber systems provided the submarine is thoroughly ventilated for one hour after fumigation (2). However, for dichlorvos to be completely effective, another insecticide—synergized pyrethrin—must be used first to drive the cockroaches out of hiding

and expose them to the more toxic dichlorvos. Another disadvantage: during the three and one-half hours needed to complete the dichlorvos treatment, all crewmembers must leave the boat. This treatment should be done only by trained personnel under the direction of an entomologist.

Recently, the Navy Disease Vector Ecology and Control Center, Jacksonville, Fla., has been working to identify a pesticide that can be carried safely on board submarines. Such a substance would have to be premixed and packaged in water; it would have to control cockroaches effectively and be



A "Red Devil" fan simulates the exhaust system on board the USS *Mackerel*, which has no power of its own.

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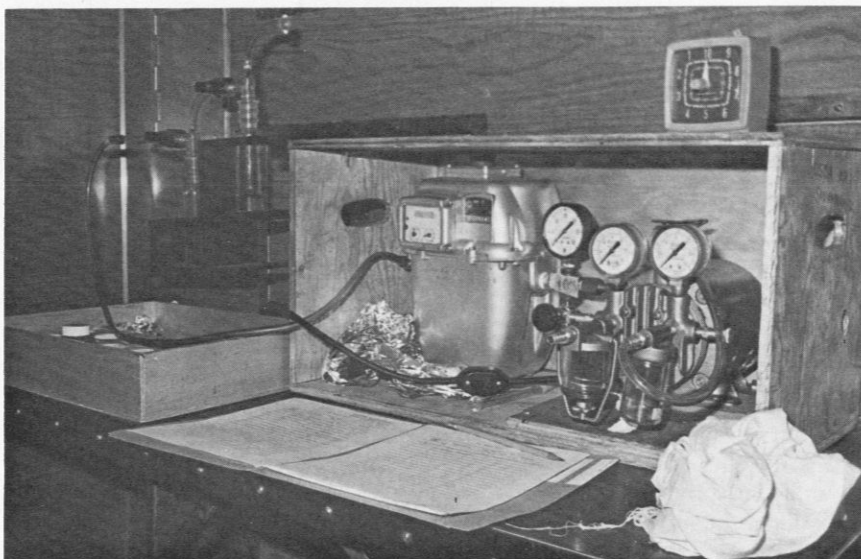
harmless to crewmembers and to air scrubber systems.

The USS *Mackerel* (SST-1), an out-of-service training submarine awaiting final disposition, has proven to be an excellent laboratory for conducting air sample studies of pesticides which might meet these requirements. Since the *Mackerel* had no power, a "Red Devil" fan was used to simulate a submarine exhaust system. Air sampling impingers, vacuum pumps and metering devices were installed in the galley and berthing areas, and air inside the submarine was sampled at regular intervals after the experimental insecticides were applied. Concentration of insecticides in the air samples was determined by the U.S. Department of Agriculture Stored Product Insects Research and Development Laboratory, Savannah, Ga.

Only chlorpyrifos (Dursban®) met all requirements. Chlorpyrifos appeared to be reasonably stable in a ready-to-use water formulation; vapors resulting from treatment were well below threshold limit values proposed by the American Conference of Governmental Industrial Hygienists (3). Studies of this substance's effectiveness in controlling cockroaches on surface vessels and submarines should provide further data needed to determine its overall acceptability for submarines. Using chlorpyrifos, submarines may finally be able to control cockroaches without relying on submarine tenders for pesticides.

REFERENCES

1. Mulrennan JA Jr, Lamdin JM, Bolton HT, Hammond CL: Atmospheric levels of propoxur aboard submarines after residual spraying. *J Econ Entomol* 68(6):755-756, 1975.
2. Mulrennan JA Jr, Grothaus RH, Hammond CL, Lamdin JM: A new method of cockroach control on submarines. *J Econ Entomol* 64(5):1196-1198, 1971.
3. Threshold limit values for chemical substances and physical agents in the work-room environment with intended changes for 1975. Threshold Limit Value Airborne Contaminants Committee. American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, 1975.



Air sampling impingers, vacuum pumps and meters test pesticides in submarines.



The USS *Mackerel*, a training submarine no longer in use, makes a good laboratory for testing pesticides.

Acclimatization and High Altitude Medical Problems in Antarctica

LCDR David B. Moyer, MC, USNR

Atmospheric or barometric pressure determines the partial pressure of oxygen* in the air, which in turn determines how much oxygen will reach the alveoli in the lungs, and how much oxygen will be transferred to the blood for eventual release to body tissues. In Antarctica, the barometric pressure and therefore the partial pressure of oxygen at a given altitude is lower by about 12% than at the same altitude in temperate or tropical zones. One reason for this phenomenon is that the atmosphere thickens slightly near the equator because of the centrifugal force of the earth's rotation. So the amount of oxygen available at the South Pole (9,100 feet) is equivalent to the oxygen at 10,200 feet in other areas; Dome "Charlie" at 10,560 feet in Antarctica offers about as much oxygen as can be found elsewhere at 11,800 feet. The summit of Antarctica's Mt. Erebus is 12,450 feet actual elevation, but the effective oxygen is equal to 13,900 feet in the Rocky Mountains.

ACUTE MOUNTAIN SICKNESS

Acute mountain sickness often occurs after ascent to altitude; its severity is increased proportionately to the speed of ascent and the height of elevation. Headache and lightheadedness are the most common complaints, but there are also varying degrees of sleeplessness, nausea, vomiting, fatigue, irritability, and rapid or intermittent breathing. Symptoms

usually begin about four hours after a person reaches high altitude.

The body has a complex set of physiologic responses to hypoxia which constitute the syndrome of acute mountain sickness. There is a large shift of body fluids from the blood into the extravascular space. The result is that too little fluid is in the circulatory system and too much fluid is everywhere else. Dehydration follows, accentuated by an increased loss of moisture through compensatory rapid breathing. The concentration of carbon dioxide in the blood thereby decreases, creating a state of respiratory alkalosis which persists during acclimatization.

Of all body organs, none is more sensitive to hypoxia than the brain, which comprises only 2% of the body's weight, yet receives 20% of the cardiac output. At high altitudes, blood flow to the brain increases by about another 40% as vessels dilate in response to lowered oxygen tension. Since the brain is in a rigid compartment and cannot be compressed, the pressure rises, causing such symptoms of acute mountain sickness as headache, nausea, vomiting, and loss of appetite. These symptoms usually peak on the first and second day at altitude and resolve by the end of one week as the person acclimatizes.

Because the critical oxygen tension at which acute mountain sickness appears varies greatly, it is impossible to predict who will have difficulty and who will not. In general, healthy people rarely have problems below 9,000 feet (or equivalent "corrected altitude" in Antarctica), while quick ascent from sea level to 13,000 feet will produce symptoms in nearly everyone.

At sea level, oxygen reaching the lungs and diffusing to the blood combines with hemoglobin to produce 97% oxygen saturation. At 9,000 feet, the saturation is 83%, still high enough to avoid problems. At 12,000 feet, however, the arterial blood at

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*Partial pressure is the pressure a gas exerts in the atmosphere or other medium. The partial pressure of oxygen at sea level in the atmosphere is 160 mm Hg (760 [barometric or atmospheric pressure in mm Hg] x 0.21 [percent concentration of oxygen] = 160 mm Hg).

rest is only 75% saturated with oxygen, with much lower values when an individual exercises. At this level the individual can be considered hypoxic: mental performance is decreased, although no difference may be noted subjectively. Memory, will power, and judgment are impaired, and there may be emotional changes (usually euphoria or depression). Fine motor coordination is poor; night vision becomes less acute. These direct effects of hypoxia occur immediately upon exposure to high altitudes, in contrast to acute mountain sickness, which follows the fluid and blood flow derangements described earlier.

Physical strength and conditioning may reduce, but by no means prevent acute mountain sickness. When a group of 120 Army soldiers was transported directly from sea level to 12,000 feet for maneuvers in Colorado, more than 50% had significant shortness of breath, nausea, and headaches. One man suffered pulmonary edema, and 18% became so ill they had to be transported to lower altitudes. During the first three days, poor stamina and decreased performance and work effectiveness were noted in the entire group.

In another case, a young Marine in excellent physical condition was incapacitated by headaches and vomiting at 12,000 feet in the California Sierra Nevada.

For unknown reasons, people in their early thirties seem to do best, while those in their late teens and early twenties often have difficulty. Men and women are equally susceptible to acute mountain sickness, but women generally have a greater resistance to the cold and any problems of hypothermia encountered at altitude.

There are other more serious, even life-threatening manifestations of acute mountain sickness. Pulmonary edema may occur 6 to 72 hours after ascent to altitude, usually in healthy young men who are poorly acclimatized. Vigorous exercise predisposes men to pulmonary edema by lowering the oxygen tension in the blood, thus increasing the already abnormally high flow of blood to the lungs; some of the excess fluid diffuses into the alveoli, making effective oxygen absorption impossible. Also unusually susceptible to pulmonary edema are men who become acclimatized, go back to sea level for some weeks or months, and then return directly to altitude.

Symptoms of pulmonary edema are extreme fatigue, weakness, shortness of breath, a mild hacking cough, and mental confusion. Much more common than previously expected, pulmonary edema is

second only to accidents as a cause of death at high altitude. Medical therapy consisting of oxygen and strong diuretics such as furosemide to remove excess fluid sometimes will be effective, but return to sea level is the only cure and proper acclimatization the only prevention.

Most of the symptoms of acute mountain sickness are attributable to increased fluid and therefore pressure in the brain. Headache and nausea are mild manifestations, while cerebral edema is the extreme. The affected individual may become disoriented, delirious, and comatose; mortality is high. Treatment is the same as for pulmonary edema, with the addition of steroids such as dexamethasone to reduce brain swelling. Again, the only real cure is descent to sea level; the only prevention, proper acclimatization.

A less common but equally serious complication of acute mountain sickness is cerebral thrombosis, or stroke. Hemoconcentration is a consequence of dehydration; blood may sludge in the brain, and the resulting arterial thrombosis may lead to paralysis or death. Adequate fluid intake at altitude is essential to prevent this disorder.

Insomnia is another common problem, primarily caused by periodic or irregular breathing (Cheyne-Stokes respirations) during sleep. This problem usually improves within several days to a week.

As elevation increases, so does the incidence of serious complications. Recently, in the Himalayas, most members of a well acclimatized group of 15 Americans had symptoms of mild mountain sickness at 16,000 feet—headache and some nausea, but no more. In contrast, among a group of 18 Germans who acclimatized poorly there was a high incidence of severe mountain sickness, including four cases of pulmonary edema, two cases of cerebral edema, and one case of cerebral thrombosis. Two members of the party suffered permanent brain damage despite optimal medical care and evacuation by helicopter to low altitude 36 hours after onset of symptoms.

ACCLIMATIZATION

Acclimatization is the process whereby the body adapts to existence at high altitude. The fluid and acid-base imbalances that lead to acute mountain sickness begin after 3 to 4 hours at altitude, are maximal at 12 to 48 hours, and then improve. At the end of one week, the body has reestablished its former state; in other words, it is acclimatized. If an individual ascends gradually to altitude, gaining only about 1,000 feet a day above the elevation of 9,000 feet, the



Navy Para Rescue team trains in Antarctica

body has a chance to adjust more slowly. When there is no abrupt change, physiological adaptation proceeds with minimal stress.

Breathing is more efficient in acclimatized people. Arterial blood oxygen increases 10% to 20%, equivalent to about 3,000 feet of altitude. An acclimatized person thus does as well at 15,000 feet as a nonacclimatized person does at 12,000 feet.

Within three to five days, however, the nonacclimatized person increases the efficiency of respiration and oxygenation of blood. Breathing, at first more rapid, becomes deeper. Larger areas of the lungs are open for gas exchange, and the routing of blood or perfusion of the lungs becomes more efficient. People who live at high altitudes all their lives have very large lung volumes with a larger area available for the exchange of oxygen and carbon dioxide. People with lung disease, on the other hand, have a lesser margin of reserve and therefore more severe hypoxia.

The process of acclimatization seems to improve with each successive visit to altitude, as shown by better performance and less deterioration. Newcomers always acclimatize more slowly than others. An individual can be ill with acute mountain sickness and still do well with no further problems after the critical period of three to five days. This adaptation is lost within weeks of descent to low levels.

There is a limit to the body's ability to acclimatize. Above 17,500 feet gradual deterioration occurs because of excessive hypoxia to which full adaptation

is impossible. When a group led by Sir Edmund Hillary spent three months in 1960-61 in the Himalayas at 19,000 feet, every member lost weight and strength despite good food and living conditions.

The most important indications of proper acclimatization are normal appetite and the ability to maintain body weight. If these criteria are met, acclimatization is complete.

RECOMMENDATIONS

Acute mountain sickness can be attenuated by acclimatization. Symptoms that arise at altitude usually can be treated effectively if the following recommendations are observed:

- For headaches, use aspirin, with or without codeine, depending on the severity of the pain.
- For insomnia, 10 mg of diazepam at bedtime is helpful.
- A high carbohydrate diet is most palatable at altitude; in general, the desire for fats decreases and the intake of sugar greatly increases.
- Adequate fluid intake is extremely important, since the thirst mechanism is reduced in acute mountain sickness. To compensate for depleted blood volume, increase fluids.
- Don't smoke. Smoking decreases available oxygen by about 10% and aggravates hypoxia.
- Stay in good physical condition to help tolerate mountain sickness and acclimatize more quickly.
- Use oxygen prudently. Administration of oxygen does not ameliorate mountain sickness and may delay acclimatization. However, oxygen should be part of the treatment for pulmonary or cerebral edema.
- Unacclimatized people may use the mild diuretic acetazolamide (Diamox) to help correct acid-base abnormalities and to reduce the incidence of headache, nausea, and insomnia associated with acute mountain sickness. One 250 mg tablet may be taken every 8 hours for one day before ascent to altitude, and every 8 hours for two subsequent days. A common side effect of the drug is tingling or paresthesia of the fingers or other areas. Acetazolamide does not reduce the incidence of pulmonary edema or the more serious altitude-related medical problems, and is questionably effective in people who acclimatize properly.
- Avoid heavy exercise during the first three to four days at altitude. Such exercise increases hypoxia and secondarily exacerbates acute mountain sickness. Work during this period is poorly productive in any case, and is not recommended.

Residual Odontogenic Keratinizing Cyst: Report of a Case

CAPT Edward L. Mosby, DC, USN
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The decision to remove embedded or impacted third molar teeth, although often made quickly, is never made lightly (1); such a decision is carefully considered, and is based on the dentist's years of clinical experience treating the complications of embedded and impacted third molars. In modern dentistry, teeth should not be removed without good reason.

Once teeth are removed, however, odontogenic cysts and tumors can develop. Although these lesions are uncommon, when they occur they are so similar that only microscopic examination can differentiate the dentigerous cyst (Figure 1) from the ameloblastoma (Figures 2 and 3) and the odontogenic keratinizing cyst (Figure 4). Early and complete removal of embedded teeth that are useless to the dental arch can prevent such lesions from occurring or enlarging. If extracted teeth and the remnants of the developing follicle or other soft tissue are submitted to an oral pathologist for histopathologic examination and evaluation, recurring lesions can frequently be identified and eliminated.

Postoperative X-rays help to determine that no tooth particles or other foreign bodies remain in the extraction site. Radiographs should be taken routinely every six months or each year after the extraction. The panoramic X-ray is an excellent screening film that gives a good indication of the progress of healing and reveals any developing pathology.

We recommend adhering to these principles:

- Judicious, early, and complete removal of non-useful embedded teeth and associated soft tissue.
- Submission of such tissues to an oral pathologist

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for examination and evaluation.

- Routine radiographs at six-month or one-year intervals after removal of teeth.

The following case emphasizes the importance of these principles.

CASE REPORT

The patient, a 26-year-old Caucasian female, presented with swelling and pain around the left third molar and anesthesia of the left inferior alveolar nerve, and was admitted to Naval Regional Medical Center San Diego, Calif. Review of her dental history revealed that a lower left third molar had been removed five years earlier.

A periapical radiograph taken before the molar was removed was essentially negative, showing a possible mesioangular impaction with some pericoronal involvement of the follicle (Figure 5). There was slight thickening of the distal surface of the alveolar bone, but no evidence of a cyst. The patient's progress after removal of this nonerupted tooth was uneventful until her present illness.

On this admission, a panorex radiograph (Figure 6) showed a radiolucent lesion measuring 5.3 cm x 3.0 cm near the left angle of the mandible. The lesion was aspirated, and cytologic examination revealed a cellular material compatible with an inflamed odontogenic cyst. The possibility of an ameloblastoma could not be ruled out.

At surgery, frozen sections of the specimen were compatible with the diagnosis of an odontogenic cyst. Permanent sections identified the lesion as a keratinizing cyst, compatible with its follicular origin. The lesion was then thoroughly enucleated and the resulting defect grafted with particulate cancellous marrow from the ilium. The patient developed no further complications, and healing was uneventful.

Keratocysts, which frequently arise in edentulous areas, may be derived from epithelial remnants of dental lamina. Of all jaw cysts, the keratinizing type is the most aggressive and most likely to recur and to be multiple. The postoperative follow-up and evaluation of patients with keratinizing cysts should include periodic radiographs and close observation.

REFERENCES

1. Laskin DM: Indications and contraindications for removal of impacted third molars. *Dent Clin North Am* 13:919, 1969.



FIGURE 1. A dentigerous cyst associated with a non-erupted third molar was discovered on a panorex X-ray during a routine examination.

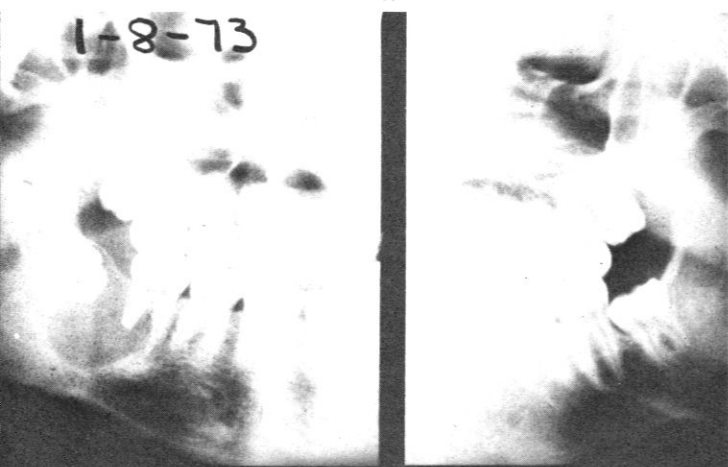


FIGURE 2. This simple ameloblastoma associated with a non-erupted third molar was discovered on panorex X-ray during a routine examination.

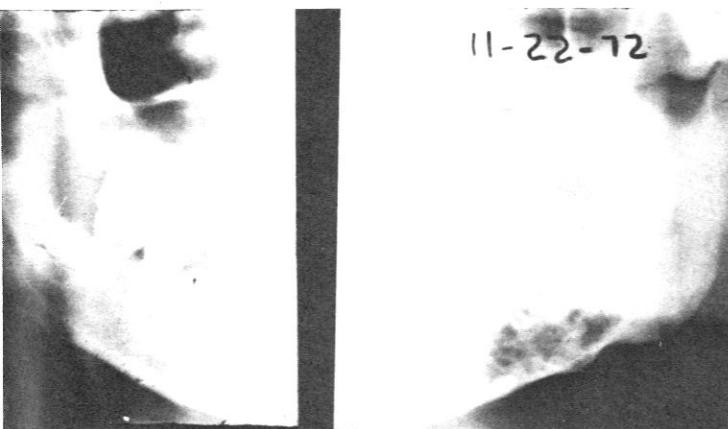


FIGURE 3. A simple ameloblastoma was discovered in a tooth-bearing area through use of a panorex X-ray during routine examination.

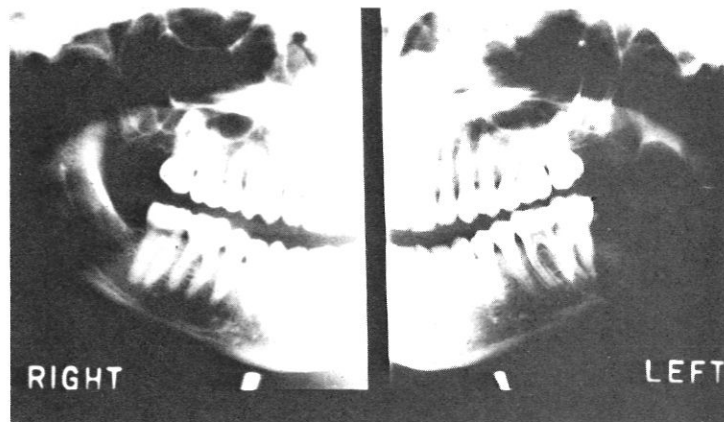


FIGURE 4. A residual odontogenic keratinizing cyst was found in the area where a non-erupted third molar had been extracted five years previously. The cyst was discovered only after the patient developed swelling and pain in the area.



FIGURE 5. This radiograph shows a non-erupted lower left third molar, which was later extracted.



FIGURE 6. This panorex radiograph was taken five years after the molar in Figure 5 was extracted.

Treatment of Infrabony Osseous Defects by Grafting: A Review of the Literature

II. Recent Success With Autografts and Homografts

CDR Gordon B. Groff, DC, USN

In a series of classic papers (1,2,3), Schallhorn claims that the most promising implant material for infrabony osseous defects is autogenous hematopoietic bone marrow from cancellous bone, because it includes a "non-antigenic scaffolding" with many viable cellular elements which might enhance a take. To ensure an adequate supply of graft material, Schallhorn chose the posterior superior iliac crest as the primary source of donor material. He limited the treated defects to those which gave predictably poor results to conventional reattachment procedures, namely defects with furcations and one, two, or no remaining osseous walls. In his analysis of 182 transplants in a military and later a civilian population, Schallhorn's most striking finding was the potential for iliac cancellous bone and marrow implants to gain crestal apposition of bone beyond the preoperative coronal bony margins. This finding had never been reported in the literature. (Histologic material later presented by Johansen (4) showed regeneration of a new ligamentous attachment to a previously exposed root surface, and regeneration of alveolar bone by means of the iliac crest grafts.)

In Schallhorn's technique, a hematologist performed bone marrow biopsies on outpatients under local anesthesia, using a Westerman-Jensen bone marrow biopsy needle. One or more cores were removed from the posterior superior iliac crest; the cores were either used immediately (carried in minimum essential media) or were frozen slowly in

25% glycerol solutions, in minimum essential media, for later use. Pockets were debrided of soft tissue and roots thoroughly planed; the osseous contours were charted. When cortical bone was present at the implant site, multiple fenestrations were made with a #2 round bur to ensure vascularity. The donor material was thawed and prepared, and one or more cores were placed snugly into the defect, with overfill whenever possible. Flaps were replaced and sutured; dry foil and a periodontal dressing were applied. Prophylactic antibiotics (erythromycin or tetracycline, 1 gm each day for seven to ten days) were given, beginning the day before surgery.

The results were impressive. The 50 crestal implants showed a mean increase in bone height of 2.57 mm. Furcation implants showed complete fill of the defect in seven of eight cases, with a mean height increase of 4.5 mm. Two-wall crater implants filled to the coronal margin in all 33 defects. One-wall implants filled completely in 11 of 21 sites, with partial fill in 8 other sites. The sequestration noted in many implant sites was thought to be related to the overfill technique, but Schallhorn believed the potential for increased coronal bone height outweighed the slight risk of sequestration. Reentry procedures done after five months to reevaluate the cases were later modified, since the density of the bone continually changed, even after 24 months. Another consistent clinical finding was pocket closure at one or two months; the closure could not be probed.

Schallhorn attributed his successful results to the proper preservation of cellular structure until the graft was implanted. The ensuing cellular breakdown and release of some "inducing substance" may then be the key to osteoblastic differentiation

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Part I of this paper, describing early research and experimentation in the treatment of infrabony osseous defects by grafting, appeared last month in *U.S. Navy Medicine* [67(10):23-29, Oct 1976].

from surrounding cellular elements. This theory agrees with Burwell (5).

In a later report (1), Schallhorn dealt with post-operative problems associated with fresh iliac transplants, including infection, sequestration, root resorption, variations in healing rate, and recurrence of the defect. Since the material used in osseous surgery undergoes necrosis and is subject to possible bacterial colonization, Schallhorn advised routine antibiotic coverage to minimize the possibility of infection. The most common fate of the graft material is partial take and partial exfoliation; according to Schallhorn, success varies with the type of defect, amount of material placed, degree of packing and overfilling, and the character and coaption of the soft tissue flaps.

Viable marrow elements may be responsible for root resorption, even when the marrow is replaced with cancellous bone. If Morris' findings (6-8) can be applied to humans, it would be desirable to modify marrow elements to preserve bone induction properties while curtailing dentinoclastic activity. Schallhorn found that root resorption was not a problem in clinical cases treated with frozen material. The degree of root planing during preparation also may have a bearing in certain cases of resorption, as Stallard and Hiatt's (9) tissue reattachment studies have shown that dentin resorption precedes cementogenesis when cementum is removed. Studies are now in progress to verify or disprove the premise that cementum retention or chemical alteration of exposed dentin may lessen root resorption potential. Mobility must also be considered a possible factor, however remote, in evaluating resorption phenomena during healing. Close monitoring of grafted sites by roentgenograms is essential during the first post-operative year. Rapid recurrence of the defect is rare, and can generally be attributed to the patient's neglect of plaque control.

In later studies (2,3), Schallhorn evaluated the use of human allograft material obtained from the iliac crest of "living cadavers" following brain death. Donor material was stored in sterile vials containing minimal essential medium with 15% glycerol, and then frozen. Blood groups and lymphocyte antigens were typed and documented for all donor material. Recipient antigens and blood types were matched against the bank of donor material. After receiving the allografts, patients were tested weekly for a minimum of six weeks for antibody formation against human lymphocyte antigens.

Block section allograft after two months revealed osteogenesis on several bony trabeculae containing

viable osteocytes. Followup studies revealed that the mean bony apposition was slightly less than results reported for iliac autografts. (The potential advantages of using banked material outweighed this consideration, however.) Although this procedure is still experimental, one result is unique and not yet explained: namely, the lack of any rejection phenomenon associated with iliac allografts. Despite histocompatibility and cross-matching tests, antigenic differences were always noted; no case presented a perfect cross-match.

Schallhorn hypothesizes that the periodontium may represent a privileged graft site for this type of transplant. An alternative view considers the dynamics of repair and the peculiarities of the periodontal lesion with its open, contaminated environment. Since volume and graft site are almost microscopic by orthopedic standards, the dynamics of repair to replace the implanted tissue occur rapidly before any rejection reaction is set into motion. Further, since the graft is placed in a contaminated environment with no way to isolate bacteria and food debris and their antigens, the immunologic mechanism of the host may be unable to detect and reject antigenic material which closely approximates itself. For example, marrow replacement and repair may have taken place before the immunologic response can occur; since bone is relatively nonantigenic, there is nothing to reject. Another possibility is that the freezing process used in the procedure may alter the antigenicity of the allograft enough to render it compatible to host tissues. However, the danger of transferring disease entities such as viral hepatitis, or of forming cytotoxic antibodies to human lymphocyte antigen cannot be ignored. By sterilizing frozen donor material with gamma radiation, thereby reducing its antigenicity, such potential hazards probably can be eliminated.

Results of a two-year study of allografts in 20 patients were extremely encouraging. Schallhorn (3) reported an average coronal bony apposition of 3.6 mm in 121 defects encompassing one, two, and three walls; 3.3 mm in 5 furca defects; and 2.06 mm in 68 crestal "no wall" defects. Clinical and roentgenographic data closely paralleled data obtained from studies of frozen iliac autografts, with no adverse periodontal reactions noted. Only two of the 20 patients developed slight cytotoxic antibody levels to human lymphocyte antigens.

Rosenberg's study (10) involving free osseous tissue autografts of cancellous bone and marrow obtained intraorally claims a high degree of predictability if proper cases are selected and strict procedural

guidelines followed. Broad osseous defects with three bony walls and deep interproximal craters are most amenable to new attachment using the autograft, according to Rosenberg. Any reentry procedures to correct remaining osseous deformities or to establish physiologic contours must not be attempted until at least one year after surgery. Dramatic results can be achieved using autografts over denuded roots and in furcations, according to Rosenberg, but with lesser predictability. He attributes his success to: a flap design which provides maximum closure over the graft; thorough root planing and decortication of bony walls to ensure clot formation; loose placement of graft material within the defect; prophylactic antibiotic coverage; effective plaque control measures; control of local etiologic factors (occlusal adjustment where necessary); and monthly postoperative visits with repeated light root planing and soft tissue curettage.

HISTOLOGIC EVIDENCE

The long sought histologic evidence that autogenous grafts can increase the coronal level of the attachment apparatus was demonstrated in 1968 by Ross and Cohen (11), who treated a combined 3-, 2-, 1-wall defect on the mesial surface of a mandibular canine in a 51-year-old male. Cancellous and cortical chip graft material were obtained from an edentulous saddle area in the mandible. A block section analysis revealed a new epithelial attachment with the base of the sulcus coronal to the crest. New cementum had formed, with new bone deposition seen around the autograft. At the crestal area of the graft were distinct resorptive lines with new bone deposition, while connective tissue had proliferated between the trabeculae of the transplant.

Matsue et al (12) provided an accurate means for radiographic quantitative analysis of bone implants, evaluating height and density with a Joyce-Loebel microdensitometer. Tracings from all patients showed similar patterns of graft resorption during the first two or three postoperative months, followed by increased bone density believed to be new bone laid down with the implant matrix. Mineralization of bone density at 11 months was similar to normal bone, and the interproximal alveolar crest level showed increased height.

Dragoo and Sullivan (13) evaluated more than 250 autografts of autogenous cancellous bone and marrow, with results similar to those of Schallhorn (14). The researchers claimed that autogenous bone offers the least chance of host rejection; that the

porous consistency of cancellous bone increases the potential for rapid revascularization and subsequent graft survival; and that marrow probably enhances the bone-inductive mechanism because of its many undifferentiated cells.

Using fresh donor material, Dragoo (15) obtained histologic evidence of a true functional reattachment following graft placement. In obtaining block section material on four patients at intervals of two, three, four, six, and eight months, Dragoo compiled the following histologic data: At two months, marked osteoblastic activity was seen in the alveolar crest. This activity gradually subsided in three to eight months, but alveolar bone regeneration was not complete even at eight months and the mature height of the new crest had not yet been obtained. By three months the transseptal fiber apparatus had begun to mature, achieving a dense functional orientation by the eighth month.

At two months the periodontal space contained a ligament that was highly cellular, vascular, and disorganized. At three months the new periodontal ligament and new bone were functional. In four to six months there was increased density of principal fiber bundles and an apparent decrease in vascularity. By the eighth month, the periodontal ligament was mature and functional, with Sharpey's fibers imbedded in new bone and new cementum.

In two months, cementum was seen from the base of the original defect to the epithelial attachment. Cementoblastic activity was greatest two to three months postoperatively.

Dragoo noted an average apposition of supracrestal bone of 0.7 mm, with 1.03 mm of new connective tissue attachment, and 1.34 mm of new epithelial attachment; the overall supracrestal attachment was 3.07 mm. Histologically this proved to be a true attachment consisting of new bone, new cementum, and new periodontal ligament with a functional periodontal ligament. Dragoo (16) also developed a simplified method of obtaining multiple cores of cancellous bone from the anterior iliac crest with a single skin puncture; he reported that postoperative discomfort from this technique seldom required analgesics.

Presurgical preparation included root planing and curettage, occlusal adjustment, achieving a plaque control level of 0.5 on Green and Vermillion's simplified oral hygiene index (17), temporary stabilization when indicated, and eight days of antibiotic coverage. Full-thickness flaps with large interdental scallops to preserve interproximal soft tissue were raised; chronic tissue was removed and roots were

lightly planed. After the cortical plate was penetrated with a small round bur, the core was placed, leaving 1.5 mm of overfill. Surgical dressings were changed every seven days for three weeks.

Because several investigators reported marked root resorption when using fresh autogenous graft material, Dragoo (13) studied the etiology and incidence of this phenomenon. He noted gingival inflammation in all cases of root resorption. When an active resorptive lesion was present, histologic examination revealed new cementum or bone to be forming in the lesion's depths. Resorption and repair both appeared to be taking place within the same lesion. Dragoo suggested that resorption is associated with chronic inflammation of the adjacent gingiva, and that root resorption lesions may undergo repair once the source of inflammation is eliminated. Further, once chronic inflammatory tissue has been removed, the epithelial attachment may shift coronally and seal off the lesion.

The mechanism by which resorption takes place is unknown. In future investigations, two etiologic factors must be considered: First, fresh marrow contains many undifferentiated cells which may contribute to root decalcification. Second, resorption of sequestered bone, seen frequently in connective tissue near the epithelial attachment, may initiate tooth breakdown, as may the proteolytic activity of polymorphonuclear leukocytes and other chronic inflammatory cells.

Early detection of root resorption is vitally important. Routine radiographic checks should be made each month after surgery. Dragoo observed that periodic light gingival curettage and meticulous daily plaque control could eliminate the chronic gingival inflammation associated with root resorption.

Scleral tissue, a by-product of corneal grafting, has been used successfully for the past ten years to repair osseous defects associated with rhinoplasty. Klingsberg (18) believes sclera—a thin avascular strip of almost pure connective tissue—to be useful in repairing osseous defects as well. Clinically, scleral tissue appears to be able to form an attachment when placed against gingival tissue, periosteum or bone.

Klingsberg's technique consists of full-thickness flap elevation, complete debridement of soft tissue, and subsequent placement of full-thickness scleral grafts cut to fit the defect at the time of surgery. In all cases antibiotic coverage was maintained for four days after surgery. There was no evidence of rejection by the host.

Klingsberg believes that the absence of antigenicity may be related to the material's avascularity. Osseous defects involving furcation, interproximal resorption, combination types, labial defects, and attached gingival deficiencies have been treated successfully with scleral allografts.

On reentry after six months, Klingsberg demonstrated that scleral grafts could be identified by their white appearance in and over the original osseous craters; the histologic fate of such grafts needs further study to determine whether the sclera is eventually calcified or replaced by bone or new fibrous connective tissue. Much of the trauma of bone grafting could be avoided by using sclera. Research is under way to clarify the application, limitations, and predictability of scleral grafts in periodontal therapy.

Most recently, Mellonig et al (19) reported on the use of freeze-dried cortical bone allografts in treating periodontal osseous defects. Thirty-seven collaborators in military and civilian practice reported on 97 osseous defects which were grafted with freeze-dried bone, and reentered one year later. Although the clinicians were given latitude as to method of placement and type of flap to be employed, they generally used full-thickness flaps, root planing, intramarrow penetration, and overfill. Wound approximation was achieved in 88 of the 97 defects. Procedures accomplished prior to graft placement included effective plaque control by the patient, scaling and prophylaxis, and occlusal adjustment, if indicated.

Results showed 50% or better regeneration in 64% of the defects, and partial fill in another 24% of the cases. No sequestration, postoperative infection, or clinical signs of immunologic rejection were reported. Freeze-dried crushed cortical bone produced favorable results with the majority of investigators when used under a variety of operating conditions.

Some investigators believe that fine particle-size graft material may help induce regeneration. Additional studies with freeze-dried bone are in progress to determine whether the potential for regeneration can be enhanced by adding autogenous cortical bone to the graft material.

SUMMARY

Many techniques have been used to treat osseous craters and defects over the past 20 years. The most recent work of Schallhorn, Dragoo, Robinson, Mellonig and others has opened exciting new avenues for continued research into the dynamics of bone, tooth, and the periodontal attachment appa-

tus. Other approaches need to be more fully explored to determine their validity and predictability.

If our approach to treating periodontal defects can change from resection (eliminating the pocket by osseous surgery, with resultant loss of tooth support) to apposition (increased crestal height and obliteration of osseous defects), we will be a step closer to achieving our goals of restoring normal physiologic osseous and soft tissue architecture, and preserving an intact dentition.

REFERENCES

1. Schallhorn R: Postoperative problems associated with iliac transplants. *J Periodontol* 43:3, 1972.
2. Schallhorn R, Hiatt W: Human allografts of iliac cancellous bone and marrow in periodontal osseous defects. I. Rationale and methodology. *J Periodontol* 42:642, 1971.
3. Schallhorn R, Hiatt W: Human allografts of iliac cancellous bone and marrow in periodontal osseous defects. II. Clinical observations. *J Periodontol* 43:67, 1972.
4. Johansen N: Human block sections in the evaluation of iliac crest grafts. Paper presented at spring meeting, American Academy of Periodontology, New Orleans, La., May 1969.
5. Burwell R: Studies in the transplantation of bone: The fresh composite homograft-autograft of cancellous bone. *J Bone Joint Surg [Br]* 48B:532, 1964.
6. Morris M: The implantation of human dentin and cementum with autogenous bone and red marrow into the subcutaneous tissues of the rat. *J Periodontol* 40:259, 1969.
7. Morris M: A study of the inductive properties of the organic matrix of dentin and cementum. *J Periodontol* 43:10, 1972.
8. Morris M: The effects of homologous bone and matrix, with and without marrow, on implanted dentin and cementum. *J Periodontol* 44:667, 1973.
9. Stallard R, Hiatt W: The induction of new bone and cementum formation. I. Retention of mineralized fragments within the flap. *J Periodontol* 39:273, 1968.
10. Rosenberg M: Free osseous tissue autografts as a predictable procedure. *J Periodontol* 42:195, 1971.
11. Ross S, Cohen D: The fate of a free osseous tissue autograft: A clinical and histologic case report. *Periodontics* 6:145, 1968.
12. Matsue I, et al: Microdensitometric analysis of human autogenous alveolar bone implants. Parts I and II. *J Periodontol* 41:489, 1970; 42:435, 1971.
13. Dragoo M, Sullivan H: Clinical and histologic evaluation of autogenous iliac bone grafts in humans. II. External root resorption. *J Periodontol* 44:614, 1973.
14. Schallhorn R: The use of autogenous hip marrow biopsy implants for bony crater defects. *J Periodontol* 39:145, 1968.
15. Dragoo M, Sullivan H: A clinical and histological evaluation of autogenous iliac bone grafts in humans: Part I. Wound healing 2 to 8 months. *J Periodontol* 44:599, 1973.
16. Dragoo M, Irwin R: A method of procuring cancellous iliac bone utilizing a trephine needle. *J Periodontol* 43:82, 1972.
17. Green J, Vermillion I: The simplified oral hygiene index. *J Am Dent Assoc* 68:25, 1964.
18. Klingsberg J: Preserved sclera in periodontal surgery. *J Periodontol* 43:634, 1972.
19. Mellonig JT, Bowers GM, Bright RW, Lawrence JJ: Clinical evaluation of freeze-dried bone allografts in periodontal osseous defects. *J Periodontol* 47:125, 1976.

DON'T MISS

Hemorrhage Complicates Transtracheal Aspiration

Transtracheal aspiration, a clinically useful technique for obtaining bacteriologic specimens from patients with pulmonary infections, is normally a safe procedure. But in some patients with a particular anatomic variant, the procedure can lead to serious, potentially fatal hemorrhage, three physicians at NRMCMC San Diego report.

In *The New England Journal of Medicine* (295[9]:488-490, 26 Aug 1976), CAPT Richard F. Schillaci (MC), LCDR Victor E. Iacovoni (MC) and LCDR Robert S. Conte (MC) report the case of an 18-year-old Navy recruit admitted to NRMCMC San Diego with a severe cough, viscous white sputum, marked lar-

yngeitis and an elevated temperature. One hour after admission, a tracheal aspiration was performed to obtain representative material for a Gram stain and culture. The patient began having hemoptysis 15 minutes after the aspiration was completed, and despite rapid intubation and an emergency tracheostomy suffered a cardiorespiratory arrest. Resuscitative efforts were unsuccessful.

On autopsy, the patient was found to have a severe tracheobronchitis and confluent bronchopneumonia involving both lungs. The patient's right cricothyroid artery was larger than normal and coursed horizontally across the mid-

portion of the cricothyroid membrane. A probe passed through the cricothyroid artery in the midline, carrying the artery's severed end into the tracheal lumen.

While the authors do not discourage the use of transtracheal aspiration, they point out that a normal anatomic variant can cause serious complications. They emphasize the importance of immediate tracheal intubation with a cuffed tube when serious hemoptysis occurs during a transtracheal aspiration. They also suggest puncturing the cricothyroid membrane toward its caudal extent, just above the cricoid cartilage, to minimize the risk of endotracheal hemorrhage.

Notes & Announcements

DENTAL CONTINUING EDUCATION COURSES SET FOR JANUARY

The following dental continuing education courses will be offered in January 1977:

National Naval Dental Center, Bethesda, Md.

Oral pathology	10-14 Jan 1977
Removable partial dentures	24-26 Jan 1977

Eleventh Naval District, San Diego, Calif.

Endodontics	3-5 Jan 1977
Removable partial dentures	17-19 Jan 1977
Oral pathology	24-28 Jan 1977

U.S. Army Institute of Dental Research, Walter Reed Army Medical Center, Washington, D.C.

Oral surgery	10-13 Jan 1977
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Letterman Army Medical Center, San Francisco, Calif.

Periodontics	17-21 Jan 1977
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Requests for courses administered by the Commandant, Eleventh Naval District, should be submitted to: Commandant, Eleventh Naval District (Code 37), San Diego, Calif. Applications for other dental continuing education courses should be submitted to: Commanding Officer, Naval Health Sciences Education and Training Command (Code 5), National Naval Medical Center, Bethesda, Md. 20014. Applications should arrive six weeks before the course begins.

Cross-country travel for dental continuing education courses and professional conferences generally will not be approved because of funding limitations. Similarly, travel from outside CONUS generally will not be approved.—BUMED Code 6.

POSTDOCTORAL ASSOCIATESHIPS AT NAVY RESEARCH ACTIVITIES

Applications are now being accepted for the Postdoctoral Research Associateship Programs conducted by the National Research Council on behalf of the Navy Medical Research and Development Command. Awards are made on a competitive basis and are tenable at five Navy facilities:

- Naval Medical Research Institute, Bethesda, Md.
- Naval Aerospace Medical Research Laboratory, Pensacola, Fla.
- Crew Systems Department, Naval Air Development Command, Warminster, Pa.
- Naval Submarine Medical Research Laboratory, Groton, Conn.
- Naval Health Research Center, San Diego, Calif.

Associateships are awarded in the following research areas: experimental medicine, immunology, undersea medicine, aerospace medicine, behavioral sciences, biochemistry, biophysics, environmental stress, microbiology, parasitology, virology, biomagnetics, physiology, and radiation biology.

Under the Associateship Program, postdoctoral biomedical engineers and medical, biological, and behavioral scientists participate in biomedical research projects conducted in Naval Medical Research and Development Command laboratories. The program is a joint effort of the NMRDC and the National Research Council of the National Academy of Sciences, Washington, D.C. The Council screens candidates' records, selects applicants, and approves the scientific merits of the laboratory projects and the credentials of research advisers.

Applications must be submitted by 15 Jan 1977. Supporting documents must be received by 12 Feb 1977. Candidates must hold an M.D., D.D.S., Ph.D. degree, or equivalent and must be research oriented.

For more details on application, specific fields of interest, and a list of required supporting documents, write to: Associateship Office (JH 606N), National Research Council, 2101 Constitution Avenue N.W., Washington, D.C. 20418.

LASER CLASSIFICATION AID OFFERED

Lasers manufactured after 2 August 1976 must include hazard classification information to ensure that proper safety precautions are instituted. But laser systems manufactured before last August may not carry such information, and so may be difficult to classify.

The Navy Environmental Health Center in Cincinnati can tell you the manufacturer, model number, major parameters, and hazard classification of nearly 2,400 lasers and laser systems. If you need help classifying a laser system, or need advice about its operation and use, contact the NEHC at 3333 Vine St., Cincinnati, Ohio 45220. The Autovon number is 989-3863.

AMBULANCE SAFETY COURSE

To help reduce accidents involving Navy ambulances, BUMED Code 5522 and the Navy Safety Center at Norfolk, Va., have prepared a safe driving course for Navy ambulance drivers. The course aims to correct two prime causes of accidents: drivers' errors, and insufficient training and supervision of drivers. Comments on the proposed curriculum are now being sought from other Navy medical facilities concerned with ambulance safety.

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